An experimental approach to group growth

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When Boundaries Between Performers
and Observers Are Breached

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When Boundaries Between Performers and Observers Are Breached

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CHAPTER 1

General Introduction

How do groups grow beyond the boundaries of active membership? This is the central question in this dissertation. From past research, we learned about how groups can be formed through processes *within* the group. However, there is, to our knowledge, no empirical work on how groups expand. Yet, there are many instances when actions of a small group of interacting individuals seem to affect bystanders socially. Think for example about a protest on the street, a concert, a performance, or a sports competition. In all these examples, audiences can get psychologically drawn into the actions of the core group (protesters, performers, athletes). It seems that when a group is able to express a sense of togetherness, solidarity can emerge among performers and observers alike. The psychological processes underpinning this phenomenon are unclear; under what circumstances does solidarity transfer from group to observer, and under what circumstances does it *not*? This dissertation aims to apply the insights from the literature on within-group processes to understand how observers become psychologically involved with the actions of a small group of actors. We[1] believe that studying how solidarity can transfer from group to bystanders can inform us about how groups can extend beyond the boundaries of their active members.

In this dissertation, we focus on how acting as a group socially affects observers. In doing so, we are not interested in the content of group interactions, but merely the physical manifestation of a group; i.e., the nonverbal interactions between and joint movement of members of a group. There are two reasons for doing this. First, communication is for a large part nonverbal (Burgoon, Stern, & Dillman, 1995; Chartrand & Lakin, 2013; Knapp, Hall, & Horgan, 2014). Nonverbal behaviours often contain many social cues and people are known to be very adept at reading body language. We therefore believe that when observing a nonverbally interacting group, people would be able to extract substantial social information from this. Second, the relationship between a core group of actors and non-participating observers has not been studied before. As we were at the start of this line of research, we wanted to begin at the basis. Language adds a layer of complexity to how interacting groups are experienced by observers. We believe it was best to avoid such complexities in our initial investigation. Taken

1 As this dissertation is a collaborative effort, I will refer to 'we', and not 'I', in the remainder of this introduction.

together, through physical interactions we would be able to manipulate group dynamics, free from any meaning from language.

To understand how observers who have no part in the interactions of the core group can come to feel psychologically part of the group, we first need to understand how core members identify with the group. Secondly, we will discuss how groups can be formed through nonverbal interactions. Thirdly, we bridge previous findings and the current work by considering how within-group processes may influence group growth, i.e., how non-participating observers can become psychologically part of the core group. Lastly, we will elaborate on the social contexts in which we chose to investigate the group-observer connection, namely performing arts and sports.

Being Part of a Group

Before we consider how groups expand, we need to understand how core members identify with a group. Over the last decades there has been ample of research on how group membership of very large groups can impact individuals' perceptions and behaviours. Earlier work on such group processes in large groups has mostly been informed by the social identity approach (Hornsey, 2008; Tajfel, 1978; Tajfel & Turner, 1986; Turner, 1985; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). This approach proposes that one's membership of very large groups can influence behaviour and thought processes because the individual derives aspects of their self-concept from this group. Such theories explain how people identify with groups because they self-categorise as members of overarching categories: they experience having a shared identity (as a woman, a Dutch person or a range of other category memberships). In later theorizing about the formation of such shared identities, the role of the individual within the group became more central. Here, it was considered that the group's shared identity can be defined by the individual members rather than the other way around (interactive model of identity formation; Postmes, Haslam, & Swaab, 2005). This theory explains how people can come to identify with small groups (and develop a shared identity) through dynamic processes of interaction and interdependencies. In the following we will discuss such processes in large and small groups in more depth.

Identification with large categories: social identity approaches

Most people are part of multiple groups that are formed around people who share socially meaningful commonalities. Think for example about group memberships that are based on nationality, ethnicity, profession, gender, or political preference. These group memberships inform us about who we, as individuals, are. This in turn, may guide social cognition as well as social behaviour. Social identity theory (Tajfel, 1978; Tajfel & Turner, 1986) captured the idea that such group memberships have implications for the self and the identity. Initial empirical work on social identities showed that people are able to categorize themselves into groups based on arbitrary and even meaningless characteristics (i.e., minimal group paradigm, Tajfel, Billig, Bundy, & Flament, 1971). That is, if you divide a group of people into two groups based on fake information about for example their art preference, group members start behaving in favour of their group and in opposition of other groups, even in the absence of any interpersonal connections. A key element in this work is that social identities are a response to perceived similarities within one's own group but perceived differences from other relevant groups. Once classified as a group, people tend to favour their ingroup, "us", over the outgroup, "them", through processes of positive distinctiveness.

Social identity theory assumes there is, next to one's social identity, also one's personal identity. Whereas with the social identity the self is derived from group characteristics, the personal identity is informed by personal characteristics. That is to say, when we derive the self from our social identity, we may consider what it means to be part of the group. For example, what it means to be Dutch is determined by the group, which in turn informs the self (e.g., we are stingy). When we derive the self from a personal identity however, we consider personal characteristics to determine the self (I am light-hearted). According to social identity theory, people's social behaviour varies along a continuum between interpersonal behaviour, determined by people's personal characteristics, and intergroup behaviour, determined by their salient social identity. Importantly, as people do not live in a social vacuum, it is implausible that there is a part of the self that is entirely uninformed by others. At the same time, behaviour that is only informed by one's salient social identity is also not likely: People's social behaviour is likely to be driven by the interaction between the two extremes.

Whereas social identity theory focuses on the intergroup relations, self-categorization theory (Tajfel & Turner, 1986; Turner, 1985; Turner et al., 1987) focuses more on how different contexts can activate different level of self-categorization. Rather than assuming that interpersonal and intergroup processes are on one continuum, like social identity theory does, self-categorization theory assumes there is a hierarchy of three different forms of identity experience that change as a function of the level of self-categorization. The *human* identity is the global identity of the self as a human being. The *social* identity is based on the self as embedded into an ingroup, contrasted to particular outgroups. The *personal* identity is based on the self in comparison to others. The level that is situationally salient determines which aspect of identity becomes self-relevant within that situation. That is, the activation of a certain identity is dependent on the context one is in. When one is, for example, the only woman in a room of men, and being a woman is self-relevant, this may make her gender identity salient, which, in turn, may inform subsequent cognition and behaviour. Self-categorization theory assumed that certain identities come with information on what a typical group member is like; i.e., prototypes. Both the experience as well as the perception of this identity can be informed by these prototypes. When one self-categorizes as a group member, this can lead them to conform to prototypical behaviour and/or adopt prototypical attitudes. Conversely, when judging groups, one can simplify the perception by ignoring the notion of the individual in the group, and merely seeing a group in terms of prototypical group characteristics, whether they actually apply to the individual or not (i.e., stereotyping). By minimizing interpersonal differences within a group, it becomes easier to judge a group because one only needs to respond to the group's overarching qualities.

Although both the theories acknowledge a personal identity, this seems to be undermined in the presence of a social identity. Social identity theory sees the interpersonal versus intergroup processes as two ends of a spectrum. This means that there is a negative interdependence between the two; more of one means less of the other. Self-categorization theory sees the personal identity and social identity as functionally antagonistic; both cannot be active at the same time. This implies that for slightly different reasons, both theories assume that you can either identify as an individual or a group member, but not as both at the same time.

Identification with small groups: individual distinctiveness in groups

Because of the focus on higher-order categorical groups, the social identity approach does not consider interpersonal relationships within small groups. When we think of groups, we do not just classify groups as deriving from sharing an overarching identity. We often form groups with people based on interpersonal connections, think for example about friends or colleagues. Here interpersonal relations are at the foreground whereas intergroup relations become irrelevant. The interactive model of identity formation (Postmes, Haslam, et al., 2005; Postmes, Spears, Lee, & Novak, 2005) recognized that there are two pathways to group formation. There is indeed a pathway to group formation that relies on social categories and shared similarities between group members. This pathway is characterized by top-down processes; group members *deduce* their identity from an overarching notion of what the group stands for, or what the prototypical member ought to be. However, the interactive model of identity formation proposed that there is another pathway to group formation that cannot be explained by the traditional social identity approach. The interactive model of identity formation introduces the idea that groups can also be formed from the bottom up. Through interactions between interpersonally distinct individuals, people can *induce* a group identity. Whereas with the deductive pathway to group formation individuality is pushed to the background, with the inductive pathway the individual is central to the formation of the group. Integrating these deductive and inductive processes to group formation into one comprehensive theory relieved the antagonistic tension between the self and the group. The interactive model of identity formation acknowledges that individual and group can coexist in different forms in which the individual is more or less central. This allowed for a more complete understanding of group phenomena.

Both the deductive and inductive pathways to identity formation can result in group members experiencing a sense of belonging, identification with the group, and the feeling of social unity (in this dissertation we use the term solidarity to capture all three components; see also Koudenburg, Postmes, & Gordijn, 2017). However, the role of the individual is very different in each pathway. The deductive pathway is characterised by similarities between members of the ingroup in contrast to outgroups (a process that is essentially

similar to traditional social identity approaches, cf. Tajfel & Turner, 1986; Turner et al., 1987). People do not need to interact with or even know other group members. The "group" is ideational: a social and psychological construct that can exert a significant psychological influence on thoughts and actions. As these groups are formed through focusing on commonalities between members and conforming to the group prototype, there is no room for individual differences; the group exists as a function of the similarities between members. Because of these similarities, the group is often not affected when a member leaves the group (i.e., if one would decide to leave the Netherlands this would not affect Dutch people). Nonetheless, these groups can elicit strong feelings of togetherness. Think for instance about how you can experience national pride when your country wins the FIFA World Cup. In such cases, experiencing a collective identity can make you experience togetherness and strength.

Conversely, groups formed through the inductive pathway revolve around material (or "real") interactions and interdependencies. Here, outgroups are less relevant (Gaertner, Iuzzini, Witt, & Oriña, 2006). In such groups, feelings of identification emerge through cooperation within which individual roles, distinctiveness and even dissimilarity are integrated (Jans, Postmes, & Van der Zee, 2011; Postmes et al., 2005; 2005). Think for example of a village in which each inhabitant has a unique profession. This community works as a function of each individual's different but complementary role. When the mailman would leave the village, the group as a whole is affected; mail is not delivered anymore. In fact, research shows that individual distinctiveness and mutual indispensability are key predictors in the social unity that arises in such groups (Jans et al., 2011; Jans, Postmes, & Van der Zee, 2012; Koudenburg, Postmes, Gordijn, & Van Mourik Broekman, 2015). That is, the complementary nature of individuals in these groups is essential for the sense of solidarity experienced by its members.

Embodiment of Groups

Because this dissertation focused on the physical manifestation of we-ness, we will look at how social interactions can shape groups. More specifically, we want to explore how groups are embodied. Here, we refer to mechanical and organic solidarity to reflect the physical and behavioural manifestation of

respectively deductive and inductive group formation (see Koudenburg et al., 2017, 2015). The manner in which individuals coordinate their interaction can correspond to either mechanical (based on similarities) or organic (based on complementarity) principles.

Similarity in interactions

Past research on how people interact has found a relationship between similarity between interaction partners' behaviour (e.g., interactional synchrony) and social bonding. Mechanisms of adapting and mirroring behaviour are believed to contribute to socialization processes (De Waal, 2008; Hatfield, Cacioppo, & Rapson, 1994). This physical coordination makes it possible to experience and converge towards other people's physical and affective state (Barsalou, Niedenthal, Barbey, & Ruppert, 2003; Bernieri & Rosenthal, 1991; Burgoon et al., 1995; De Waal, 2008; Foster, 2008; Hatfield et al., 1994; Hawk, Fischer, & Van Kleef, 2011; Knoblich & Sebanz, 2006). Copying actions of others can lead to the experience of blurring boundaries between self and others (Smith, 2008; Wheatley, Kang, Parkinson, & Looser, 2012). This can also happen when people synchronize their behaviour, i.e., when they match behaviour exactly in time. People who behave in synchrony with others experience social unity, cooperate more with their co-actors, and behave more pro-socially (Miles, Nind, & Macrae, 2009a; Reddish, Bulbulia, & Fischer, 2014; Reddish, Fischer, & Bulbulia, 2013; Reddish, Tong, Jong, Lanman, & Whitehouse, 2016; Valdesolo & Desteno, 2011; Valdesolo, Ouyang, & Desteno, 2010; Wiltermuth & Heath, 2009).

There are many example of synchrony, or similarity of behaviour. Think for example about mirroring someone's posture or walking in synchrony with a friend; often you are unaware that this happens. However, there are also more explicit expressions of synchrony. Rituals, sports, or performing arts can include (elements of) synchrony specifically because of its strong social impact. For instance, marching in an army, can convey unity and strength to opponents, but also make the individual soldier feel less vulnerable because they are part of a group (McNeill, 1995). Cheering *in sync* during a football match or a demonstration can be a way to experience and express togetherness.

It is important to note that not all the behaviour described above has to be exact similarity of behaviour. Indeed, when marching in the army the exact

synchrony is essential for the group to feel socially and physically strengthened. However, many interactions are not necessarily about pure synchrony, but more about similarity of actions, intentions, or behavioural patterns (see also Campbell, 1958). For example, people in a room may all be standing in one corner facing the same direction. When entering such a room, you may copy this behaviour. This is not synchrony per se, but behaving similarly according to what is automatically perceived to be the norm.

Complementarity in interactions

There are also forms of interaction in which similarity of behaviour is not present or constructive. Sometimes actions or roles of individuals are actually different but complementary. For instance, everyday conversations depend on interaction partners smoothly interchanging the role of speaker and listener. Only when this speech coordination runs smoothly it results in feelings of we-ness, whereas failure to coordinate hampers the development of a positive relationship (Koudenburg, Postmes, & Gordijn, 2011, 2013). During such everyday interactions these behaviours, and in particular coordinating these behaviours with interaction partners, are important for forming and maintaining relationships (see also Bernieri, Davis, Rosenthal, & Knee, 1994; Bernieri & Rosenthal, 1991; Burgoon et al., 1995; Kendon, 1970; Koudenburg et al., 2015; Lakin & Chartrand, 2003).

There are also examples of complementarity of co-action outside the context of everyday interaction. In team sports like football, individual team members will each behave in complementary ways such that the team together forms a functional whole. It is essential that the individual actions are well-coordinated to produce the best outcome for the team (Duarte, Araújo, Correia, & Davids, 2012). When this happens well, this will, just like synchrony, make individuals feel part of a strong and cohesive group. However, unlike synchrony, these co-actions are based on interdependency between individuals. The groups as a whole will not function the same with a member less; each group member is essential to the group.

Prior research on similarity versus complementary in group interactions: different pathways to solidarity

In the research that preceded this dissertation we aimed to show that these distinct forms in which people can coordinate their interactions would lead to group formation based on the principles that underlie deductive and inductive identity formation processes (Koudenburg et al., 2015). In other words, expressions of mechanical solidarity (similarity of behaviour) would lead to the experience of solidarity through deductive processes, while expressions of organic solidarity (complementarity of behaviour) would lead to the experience of solidarity through inductive processes (see also Figure 1, Chapter 3). As predicted, our research showed that both mechanical and organic types of interactional dynamics lead to the experience of solidarity. However, we learned that different types of interactional dynamics within a group can elicit feelings of solidarity through different pathways that match deductive and inductive processes (Koudenburg et al., 2015).

In this research, groups of participants were asked to sing or speak in synchrony (expressing mechanical solidarity) or by taking turns (expressing organic solidarity) or they were asked to speak or sing individually. After this, we measured whether participants experienced solidarity with the other participants (with whom they vocally coordinated) by measuring entitativity (feeling that the group is an entity), identification, and belonging. Additionally, we measured whether individuals felt that they were personally valuable to the group and whether they perceived that the other participants in their group were personally valuable. We found that participant who had vocally coordinated (either in synchrony or by taking turns) experienced more solidarity with the other participants in their group than participant who had performed solo. Furthermore, participant who took turns speaking or singing felt more personally valuable to the group *and* perceived that other group members were more personally valuable compared to participants who had vocally synchronized. Most importantly, this mutual personal value mediated the relationship between turn-taking behaviour and the experienced solidarity. In other words, because participants in the complementarity condition felt mutually valuable i.e., they experienced themselves *and* other participants to be valuable to the group, they experienced a high sense of solidarity. This

was not the case for the participants who had synchronized; they experienced equal levels of solidarity as participants in the complementary condition, but not because they felt personally valuable.

In sum, the way actions between individuals are coordinated can result in group formation based on distinct principles. These principles reflect the two different pathways that were distinguished in previous work on group formation (Postmes, Haslam, et al., 2005). That is to say, coordinated actions among a group of people can, via the psychological processes of deduction or induction, lead to the experience of solidarity. This initial research about how interactions can lead to group formation served as the cornerstone of this dissertation.

Group Growth

So far, the literature assumes that the process underlying deductively formed groups and inductively formed groups are distinct: Deductively formed groups are based on similarities but do not require members to know or interact with one another whereas inductive groups are precisely based on interdependencies and interactions. The qualitative difference between these groups should have consequences for group growth. In deductively formed groups, members do not need to interact; in fact, often members of these groups do not personally know one another (think for example about nationality or gender). Because interactions are not a prerequisite, these groups can be very large. However, such groups may have the limitation that they can only grow when members share the social identity of the target group (e.g., sharing nationality or gender). Because inductively formed groups are reliant on interactions between individuals in the group, there should be a limit to the size of the group. Because of limited brain capacity, humans are believed to be unable to maintain interpersonal relationships with more than 150 people (Dunbar, 1992, 1993; Hill & Dunbar, 2003). Because social networks have such restrictions, one would assume that inductively formed groups cannot grow beyond this number. However, in this dissertation we argue that one does not have to be part of the interaction of the core group to experience a psychological connection with them. We believe it can be achieved by observing expressions of solidarity, either mechanical or organic.

The goal of this dissertation is to take the first step towards looking at such group growth processes. We explore the idea that both mechanical and organic processes may enable group growth. We do this by extrapolating from within group processes, in particular the distinction between the two pathways to solidarity, to explain how bystanders can be socially affected by groups in their environment. Thus far, research has focused on looking at group formation among core group members. This dissertation looks at how and when (and when not) observers get drawn into the solidarity expressed by the core group. Moreover, the social impact of observing people interact may extend beyond the mere development of a psychological bond between individual observer and the group; the observers as a group may be affected. Through collectively sharing a social experience with fellow observers, the observers as a group can feel, and perhaps even act, in line with the solidarity displayed by the core group. This way the psychological group boundaries grow beyond the interacting target group to include mutually connected observers.

When we look at the process of group growth through the transfer of solidarity from the interacting group to non-participating observers, we distinguish four elements that we would like to consider. Firstly, the observer needs to be able to socially interpret the interactions within the target group; i.e., social perception (Figure 1a). Secondly, the observer needs to experience some form of a relationship with the target group they are observing (Figure 1b). Thirdly, when observers are collectively exposed to an interacting target group, this could also affect the relationships among observers (Figure 1c). Finally, when both target group and observers experience the transfer of solidarity, it could affect the overarching sense of solidarity experienced by all; a new social structure may emerge (Figure 1d). Below we will elaborate on each of these elements.

Social perception

During interactions, we do not simply send signals through nonverbal channels, we are also sensitive to receiving and interpreting nonverbal signals. This happens when we are part of an interaction, but naturally, we can also use this skill when observing others interact. Indeed, research confirms that humans can make social inferences when merely observing others interact (Bernieri

et al., 1994; Ip, Chiu, & Wan, 2006; Lakens, 2010; Lakens & Stel, 2011). It thus appears that when we watch others interact we are just as sensitive to reading body language and making relational inferences based on this as when we are part of the interaction. So, the coordination of behaviour between interaction partners is not only informative for the interaction partners involved, passive bystanders also use observations of co-action between others to determine whether these individuals belong together or form a social unit (Figure 1a). The way a target group is socially perceived should be different for mechanical and organic expressions of solidarity. In particular, we believe that groups expressing mechanical solidarity would be perceived as unified, whereas groups expressing organic solidarity would be perceived as unified as well as individualized. We believe that these social perceptions are the first step in the development of a relationship between observer and target group.

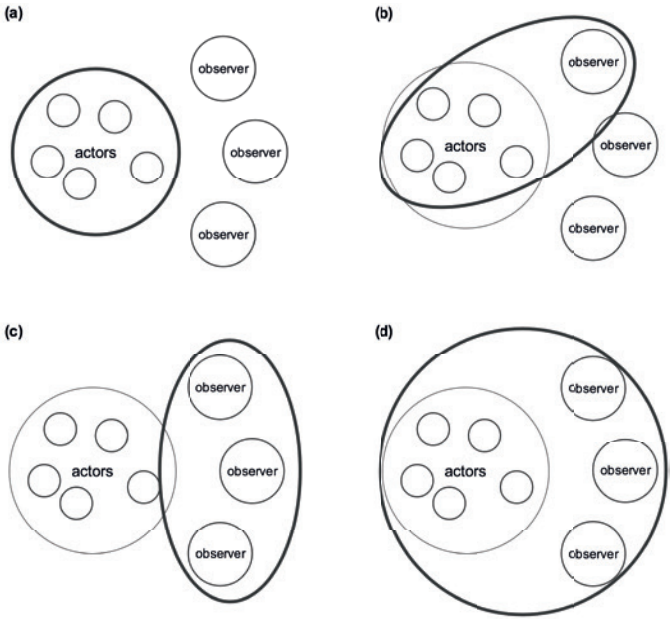

Figure 1. Schematic overview of the group growth

Relations with the target group

Once observers have interpreted the interactions from the core group, we believe they will be able to internalize the social relations from the target group (Figure 1b). There is research showing that people are able to develop parasocial relationships with for example characters on television (Giles, 2002). However, this research is not so much focused on the transfer of solidarity, but more on the relationship individuals experience with other (fictitious) individuals. However, given that people are able to interpret interactions from others, we believe that it should also be possible to experience solidarity with the interacting group. Moreover, we would predict that the way in which a target group interacts (i.e., expressing mechanical or organic solidarity) should affect the solidarity observers experience. That is, we predict that both expression of mechanical and organic solidarity can lead to the experience of solidarity among observers, but that they should be experienced through distinct pathways corresponding to deductive and inductive identity formation. Furthermore, the relations observers develop with an interacting target group, may be dependent on the shared social identity between observer and target group. Solidarity from the core group may not be transferable when observers perceive the target group to be outgroup.

Consequences for the social structure

Lastly, we assume that observing others interact together can affect the relationships experienced among the members of the audience (Figure 1c), and ultimately could affect the relationship experienced among target group and observers as a whole (Figure 1d). This is particularly interesting in contexts in which actors and observers come together in the same physical space. Think for example about a concert or other types of performances. It seems very likely that well-coordinated interactions among performers will affect performers and audience alike.

There is related evidence that identification processes can play a role in crowd situations at for example festivals or cultural rituals. The idea behind this is that when groups of people come together at a collective event, they are able to experience a shared sense of togetherness (collective effervescence; Durkheim, 1995). Empirical work on this notion has focused on how

identification with the crowd will lead to increased physical immersion in this crowd or to a more positive experience at the event (Hopkins et al., 2016; Novelli, Drury, Reicher, Stott, & Reicher, 2013), and how participating in such events can increase identification, a sense of social integration, prosocial behaviour, and cooperation (Fischer, Callander, Reddish, & Bulbulia, 2013b; Páez, Rimé, Basabe, Wlodarczyk, & Zumeta, 2015; Xygalatas et al., 2013). There is also some evidence that merely observing others participate in such events can affect observers in a similar way as participants (Konvalinka et al., 2011). However, in this research they only tested synchronization of heart rates between participants and observers who were related to the participants. Although this research about crowd identification suggest that it is indeed possible for people to experience solidarity at collective events, it focuses mostly on people who participate in an event and not on how a nucleus of actively participating people can affect a larger crowd of non-participating observers. However, the research is a first indication that it may be possible for solidarity to spread through large crowds by merely having likeminded people come together and act together in the same space.

Observer-Group Processes in Different Social Contexts

In this dissertation, we explore how situations in which groups and observers come together can affect the solidarity experienced between observers and the target group. We chose performing arts and team sports as two social contexts in which "passively" observing others coordinate their (inter-)actions is natural. Also, we chose these contexts because we expected that it would be relevant to investigate the relationship between observer and group in these contexts.

Performing arts: dance and music

Dance, music, and more broadly performing arts are part of societies since human existence (Brown, 1991; Spencer, 1985). Performing arts can be used in cultural rituals to enhance a sense of community and to reflect a culture's values and beliefs (Beeman, 1993; Evans-Pritchard, 1928; Ingold, 1994). For example, tribes may dance and make music to celebrate birth, death, or marriage, perform musical or theatrical rituals to prepare for war, or perform just to entertain. Many of these performing traditions are still manifested in modern societies. We know that these activities can bring a community together;

performing such rituals can strengthen bonds between people within the community (Beeman, 1993; Fischer et al., 2013b; Spencer, 1985; Xygalatas et al., 2013). Not only active participants can experience this sense of togetherness, audiences also get entrained by the performance, merely by observing the others (Beeman, 1993).

The purpose of performing arts are to engage and entertain the audience. In the anthropological literature, performing arts are seen as a meaningful reflection of society and the expression of cultural values:

> "Spectacle is a public display of a society's central meaningful elements. (....) The meaningfulness of a spectacle is usually proportionate to the degree to which elements displayed to the public seem to represent key elements in the public's cultural and emotional life. It is almost as if the mere event of displaying these symbolic representative elements in a special framed context is enough to elicit strong positive emotional responses from the observing public" (Beeman, 1993, p. 380).
>
> He later states:
>
> "Theatre does even more than engage participants and spectators in the immediate context of the theatrical event. It evokes and solidifies a network of social and cognitive relationships existing in a triangular relationship between performer, spectator, and the world at large" (Beeman, 1993, p. 386).

There is thus a great expressive power emanating from interactions displayed on a stage. This expressive power may lead audience members to get psychologically engaged in the performance.

If performing arts psychologically engage the audience and the audience is sensitive to understanding the interactions displayed, we wonder how the coordination between performers on stage affects the perception and experience of solidarity in the audience. In this dissertation, we hope to shed light, more generally, on group formation and group growth phenomena (the process of group expansion by inclusion of psychologically involved observers) and, more specifically on the role that performing arts, such as dance and music, have in constructing social dynamics and facilitating social bonding among audiences and performers. On top of this, working together with performing artists will provide valuable insight into their understanding and experience of

the performer-audience relationship. Learning how they "manipulate" audiences can help us discern what makes audiences socially engage.

Team sports

Like performing arts, engaging in sports is universal (Guttmann, 1986). In the same vein, sports events are likely to have a social impact on its observers, just as performing arts. One important distinction between most sports and most performing arts is that sports often have a competitive element. That is, fans watch 'their' team compete against another team. Because of the intergroup dynamics in sports, the social identity approach might be more relevant in explaining why observers, or fans, can come to experience a bond with 'their' team while watching them (Rees, Haslam, Coffee, & Lavallee, 2015). Indeed, research shows that sports fans are able to identify strongly with their team which can have positive consequences for their sociality and health (Branscombe & Wann, 1991; Wann, 2006). Furthermore, sports fans can experience great camaraderie among fellow fans of the same team, and this sense of belonging and camaraderie appears essential to the appeal of watching and following sports. When watching a live game (on location), audiences can cheer in unison and this seems to result in an intense experience of solidarity among the audience, which in turn can boost the athletes' performance. In sum, there are reasons to believe that the social component as well as the competitive element in team sports are central to draw in audiences in such a way that a strong bond is formed between team and observers.

Because of the intergroup dynamics in team sports, this context is especially interesting for us to investigate. Namely, it offers us the possibility to explore the boundary conditions of identification processes between observers and groups. In such competitive contexts, observers usually watch and support teams with which they share a social identity. Thus, when observing a team, prior shared identities may start playing a vital role in the experience of solidarity. It is therefore possible that observers experience less solidarity in line with an interacting team when this is the opponent, i.e., when observers do not share a social identity with this team. By investigating the relationships that observers develop with in- and outgroup teams, we potentially uncover when solidarity does *not* transfer from the interacting group to the passive observer.

Overview of the Chapters

Each of the empirical chapters in this dissertation is written as separate empirical paper for scientific publication. As a result, there is some overlap in the theoretical background described in each of the chapters. Below we outline the content of each of the empirical chapters.

Chapter 2

In the first empirical chapter of this dissertation we investigated the relationship audience members developed with a group of performers during live dance performances. We were interested in whether audiences would (a) be able to recognize different expressions of solidarity, (b) be able to experience solidarity in line with a target group, and (c) whether this would affect solidarity experienced among the audience. We worked together with choreographers and dancers to develop different dance performances that would reflect mechanical and organic solidarity, or in which dancers performed as independent individuals. Two consecutive years at a performing arts festival we presented each of these three performances to different audiences who were unaware of the purpose of the research. In order to study how the interactions between dancers affected audiences in a standardised manner, each performance was performed with the same performers, music, light, and costumes. Subsequently, we measured through questionnaires whether audiences were able to recognize the social structure among the dancers (social perception, Figure 1a) by measuring perception of entitativity and perception of personal value. Furthermore, we measured the solidarity audience members experienced with the dance group (Figure 1b), among the audience (Figure 1c), and among both audience and performers (Figure 1d) with measures of entitativity, identification, and belonging. Here we hypothesised that when the performers expressed solidarity (versus when they acted independently), audiences would be able to experience solidarity with the performers. Moreover, we expected that mechanical and organic solidarity would be experienced differently because the role of the individual performer would be different in each. That is, we expected that audiences would experience solidarity with the dancers who expressed mechanical solidarity because they would observe unity among the dancers. However, we expected that audiences would experience solidarity with the

dancers who expressed organic solidarity not only because they perceived unity among the dancers, but also because they perceived each individual dancer to be valuable to the group. In Experiment 3, we aimed to replicate the findings from the two field experiments in the lab by having participants watch videos of the dance performance. Here we could retest our hypotheses under conditions of greater experimental control.

Lastly, in order to investigate how the transfer of solidary affected the relationships among audiences as a group (Figure 1c), we also observed post-performance audience behaviour. In Experiment 2b, we observed group behaviour during a cooperation task in which we looked at the emergence of structure among audiences. Here, we were able to study group behaviour as a consequence of being exposed to expressions of solidarity and see how new social structures emerge as a result.

To sum up, in this initial set of studies, we were able to test how social perception (Figure 1a) can determine the relationship you develop with the target group (Figure 1b), and with the audience (Figure 1c). This first empirical work focused on testing our hypothesis under ecological valid conditions; in the field with professional performers. However, because the performers were involved in the research, we could only look at audience responses, not how performers were affected.

Chapter 3

In the next empirical chapter, we shift the focus of the research to investigate social effects of performances on both performers and observers. In two lab-based experiments we investigated this effect among non-expert performers, who had no prior experience or training in performing in front of others. We invited groups of participants to the lab and assigned them to be either actors or observers. Actors were asked to perform in an "airband": playing imaginary instruments to music. We manipulated mechanical and organic solidarity through similarity of actions versus individual distinctiveness of actions. That is, actors in the mechanical solidarity condition all played air-guitars, whereas actors in the organic solidarity condition were free to choose any unique "air-instrument" (i.e., an instrument that was not chosen by any of the other actors). In the control condition actors either did not act (Experiment 1) or performed solo's (Experiment 2). Observers were always instructed to merely watch the

actors perform. After the performance, we measured the relations among the actors and the observers and compared whether observers experienced solidarity (entitativity, identification, and belonging) to the same extent as actors. Here we predicted that expression of mechanical and organic solidarity (compared to the control condition) would lead to the experience of solidarity among actors and observers alike. Furthermore, we predicted that expression of organic solidarity would lead to the experience of solidarity because actors would feel more personally valuable to the group.

In Experiment 2 we also investigated post-performance behaviour among the groups of both actors and observers. Here we observed how groups warmed up in preparation for an ostensible competition against other groups. We looked how active groups were during this group task, i.e., how much effort they exerted in the warm up task. Here we expected that sharing the experience of the performance together, either as actors or observers, would affect how the group as a whole would interact.

Chapter 4

In the last set of studies, we explored the boundary conditions of the transfer of solidarity. Specifically, we were interested whether and how sharing a social identity (or not) with the target group of interest, would affect social perception and the relationship observers develop with a target group. Because we wanted to investigate the observations of a target group within an intergroup context, we chose a sports context. In three studies, we showed participants videos of an amateur football team warming up in synchrony (expressing mechanical solidarity) versus asynchrony (lack of expressing solidarity). Participants were told that the team was either ingroup or outgroup. We measured how participants perceived the target group by measuring perceived entitativity and competence, and how they socially related to the target group by assessing their levels of identification, support, and belonging.

Together, these chapters explore how groups can expand when previously unacquainted observers can come to feel psychologically included in the solidarity expressed by an active group. With that, we hope to provide a better understanding of how people are affected by their social surroundings and how this can potentially (re)shape social structures in society.

CHAPTER 2

The Impact of Art:
Exploring the Social-Psychological Pathways That Connect Audiences to Live Performances

This chapter is based on Van Mourik Broekman, A., Koudenburg, N., Gordijn, E.H., Krans, K.L.S., & Postmes, T. (2017). The Impact of Art: Exploring the Social-Psychological Pathways That Connect Audiences to Live Performances. *Manuscript submitted for publication*.

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Abstract

Group growth is of fundamental importance to understanding social influence. How do passive bystanders become psychologically involved when observing a small group of actors? Our hypothesis was that the kind of solidarity displayed by the group shapes the bonds that emerge with an audience. To study this, we conducted two field experiments at a performing arts festival and one lab experiment in which we studied audience responses to dance performances. We designed performances jointly with choreographers: dancers acted as an aggregate of individuals or displayed mechanical or organic solidarity. As predicted, the bond that the audience developed with the dancers was influenced by the kind of solidarity on display. When dancers displayed mechanical solidarity, the perceived unity among them predicted the emergence of bonds. When organic solidarity was displayed, the individual value of each dancer *also* played a key role (Experiment 1, 2a, and 3). Interestingly, overall artistic evaluation was affected in parallel with the development of bonds: the kind of solidarity displayed influenced performance evaluation. Finally, Experiment 2b showed that solidarity displayed on stage influenced the post-performance cooperative behaviour among audience members. The paper ends by reflecting on the social psychological pathways by which performing arts influence communities and society.

Introduction

Socialization and group formation tend to be studied in small, interactive groups (Levine & Moreland, 1990; Moreland & Levine, 1982). But on reflection, there are many situations in which people develop bonds with groups that they are not actively part of. Humans seem to not just tune in to the social interactions that occur in their immediate environment, they seem to internalize them. When people listen to a staged debate, in their minds they may enter the dialogue. When people incidentally overhear a conversation among complete strangers on the train, bus or plane, they may feel drawn in and, in some sense, part of the group. Such vicarious participation is particularly salient in sitcoms and talk shows whose formats appear to be designed to elicit audience identification (Giles, 2002). Notably, this process also occurs non-verbally in artistic performances such as dance or music, which can evoke a remarkable emotional and/or physical connection between performers and the audience (Beeman, 1993; Spencer, 1985). Viewers may identify with the performers or experience a sense of captivation (sitting on the edge of one's seat). In some cases, the involvement can even lead to active participation: People may clap, shout, dance, or sing along with the performers. In sum, even when people merely observe others as a "bystander" or "audience" they can become involved vicariously.

Social-psychologically, this phenomenon of an emergent psychological bond between audience and performers may have parallels with processes of group formation. Building on recent insights from research on group formation (Koudenburg, Postmes, et al., 2017b; Postmes, Haslam, et al., 2005), the present paper proposes that due to vicarious participation of the audience, familiar processes within groups may be a useful starting point to explain how bonds between audience and actors develop. In two experimental field studies and one lab study, we investigate how audiences respond (psychologically and behaviourally) to a target group who expresses solidarity through movement on stage.

We chose to investigate the emergence of bonds between actors and audience during dance performances in a theatre setting. One of the main reasons for focusing on the medium of dance is that this art form is universal across time and cultures, and has important community functions. This suggests

that dance may be an ideal medium to forge social bonds between audience and performers.

Cooperation, group formation and the emergence of solidarity

The core proposal of this paper is that the development of a bond between audience and performers can be understood as a process of *group formation*. Because an audience can vicariously participate in the interaction, the same processes we know from the small group literature on group formation can be applied to the process by which bonds develop between a 'passive' audience and a small group of actors. Specifically, we can build on our recent research on group formation in small interactive groups (Koudenburg et al., 2013, 2015; Koudenburg, Postmes, et al., 2017b). In this work, we use the term solidarity to refer to three distinct but correlated indicators of "we-ness" that reflect perceived unity at the collective level (entitativity), bonds at the individual/interpersonal level (belonging and acceptance by other group members) and ties of the individual to the collective (identification; see Koudenburg, Postmes, & Gordijn, 2017). Solidarity refers to all three, not in order to obscure the differences between them, but to do justice to the empirical reality that in small group formation, these three tend to develop in tandem.

Our starting point is the interactive model of identity formation (Postmes, Haslam, et al., 2005; Postmes, Spears, et al., 2005). This model integrates knowledge about the interactive dynamics of small groups with the social identity dynamics of larger social categories and argues both play a role in group formation. The model argues that solidarity can develop via two non-exclusive pathways: a bottom-up and a top-down process. According to the model, a social identity can be constructed or negotiated *organically* through interactions between individuals (bottom-up induction) but it can also be *mechanically* deduced from group level comparisons with relevant out-groups (top-down deduction, for empirical evidence see e.g., Jans et al., 2012; Koudenburg et al., 2015; Meeussen, Delvaux, & Phalet, 2014; Swaab, Postmes, & Spears, 2008). In the mechanical top-down process, group members behave in a relatively uniform fashion. But in the organic bottom-up process, individual contributions that are complementary can be integrated over time (cf. E. Durkheim, 1984).

Both mechanical uniformity and organic complementarity can be achieved verbally or nonverbally (Koudenburg, Postmes, et al., 2017b; Koudenburg et al., 2015). Particularly relevant for the present paper is prior research, which shows that coordinated physical actions promote social bonding (Beeman, 1993; Evans-Pritchard, 1928; Fischer et al., 2013b; Ingold, 1994; Spencer, 1985; Xygalatas et al., 2013). Synchronisation of *uniform* movements can blur the distinction between self and other, and enhance rapport and affiliation (Hove & Risen, 2009; Koudenburg et al., 2015; Marsh, Richardson, & Schmidt, 2009; Vacharkulksemsuk & Fredrickson, 2012; Valdesolo & Desteno, 2011) and facilitate cooperation (Reddish et al., 2013; Valdesolo et al., 2010; Wiltermuth & Heath, 2009). Furthermore, due to uniform movement in groups, individuals may feel more positive, secure, and stronger (Novelli et al., 2013; Páez et al., 2015). All this prior research has focused on movement which is mechanical in the sense that group members act uniformly. But importantly, interaction partners can also *organically* coordinate their behaviour, for example when group member complement each other (cf. behavioural meshing; Bernieri & Rosenthal, 1991). This can be seen in ballroom dance, team sports, or cultural rituals, and is likely to have similar effects on social solidarity (Koudenburg et al., 2015). When people dance together, for instance, each may perform a distinct role but the joint movement forms a meaningful whole. According to our theoretical model the psychological pathway to unity should be very different in such organic cooperation.

In a recent series of studies examining this model, we tested these ideas and showed that organic and mechanical pathways both contribute positively to the emergence of solidarity, but in very distinct ways (Koudenburg et al., 2015). Specifically, we showed that both forms of coordination (compared with a no-coordination control condition) lead members of newly formed small groups to score higher on the three indicators of solidarity mentioned above. However, the relation of the individual to the group played a markedly different role. While organic and mechanical coordination both raise solidarity levels, only the effects of organic coordination (vs. mechanical coordination) were statistically mediated by the perceived personal value of individual contributions (Koudenburg et al., 2015, Experiment 1, 4, and 5). Thus, group members' personal contributions to the group are central to the organic

pathway, but not to the mechanical pathway: in mechanical coordination the individual is secondary to the overarching identity of the group.

The organic and mechanical pathways to group solidarity are not mutually exclusive, but reflect distinct processes through which a sense of solidarity can emerge. We see that in small groups meshing of distinct individual behaviours and harmonious collaboration can organically lead to a high degree of solidarity: these groups are entitative, members feel a strong sense of belonging and are highly identified. But solidarity can also be achieved through the more mechanical embodiment of uniformity and similarity.

It is important to note the differences between the mechanical-organic distinction and the individualism-collectivism dimension in cross-cultural psychology (Green, Deschamps, & Páez, 2005; Hofstede, 1980; Singelis, Triandis, Bhawuk, & Gelfand, 1995; Triandis & Gelfand, 1998). There are parallels, but a key distinction is that many conceptualizations of the individualism-collectivism dimension assume that, at the individual end of the continuum, social solidarity would be low (cf. Tajfel, 1978, interpersonal-intergroup continuum). In contrast, although individuality is central to organic processes, this coincides with a strong sense of solidarity and this is therefore not the same as individualism (Jans et al., 2011).

The idea of complete individualism without *any* solidarity has often been associated with a breakdown of basic societal institutions such as norms and basic trust: a point where anomie sets in and individualism may descend into competition (E. Durkheim, 1984; Featherstone & Deflem, 2003; Merton, 1938). Individualism (in the sense of a complete independence of the individual) may be maximised in situations in which solidarity is limited. Think for example about the lack of connectedness characteristic of commuters on the London underground during rush-hour (Drury, Cocking, & Reicher, 2009). Under normal conditions, this is a setting in which independent individuals pursue their own goals and do not interfere with each other in so doing (cf. Hui & Triandis, 1986, definition of individualism). Such an *absence* of overt cooperation is perhaps the best situation to which one can compare the organic and mechanical cooperation described above.

The present research applies these insights to the question how passive bystanders become psychologically involved when observing a small group of

actors. We propose that the same processes that contribute to the formation of a sense of solidarity *within* groups can explain why outsiders (an audience) can develop a sense of solidarity with performers. Accordingly, we propose that observing a performance that expresses organic or mechanical solidarity can foster feelings of solidarity with the target group, but that the personal contributions of target group members should only matter for the emergence of organic solidarity, not for mechanical solidarity.

Vicarious participation in groups and its consequences

The present research assumes that an audience can, in a sense, become psychologically part of a small interactive group even if it does not actively participate. This is not a mystical process, for it occurs in mundane settings such as watching a movie. Through processes of identification with characters on screen, we are able to align our own emotions with theirs. Even though we know that the characters on screen are not real, we can easily put ourselves in their shoes (see e.g., Giles, 2002). These same processes can occur when watching other types of performances (e.g., a dance performance, a football match, or a collective ritual) and this can foster a sense of community in the spectators (e.g., Beeman, 1993; Von Scheve, Beyer, Ismer, Kozłowska, & Morawetz, 2014; Xygalatas, Konvalinka, Bulbulia, & Roepstorff, 2011).

There are numerous reasons why audiences may, through vicarious participation, become emotionally involved. The vicarious process itself is well documented: it is central to human learning and experience (Bandura, 1965; McCann & Pearlman, 1990). Observers tend to mirror a target's behaviour during an interaction: this mirroring appears to help them understand what others are communicating (Barsalou et al., 2003; Hatfield et al., 1994; Hawk et al., 2011; Knapp et al., 2014). Possibly as a result, mirroring and mimicry are shown to have a positive impact on the relationship (Lakin & Chartrand, 2003; Lakin, Jefferis, Cheng, & Chartrand, 2003; Stel, van Baaren, & Vonk, 2008). The consequences of vicarious participation can be witnessed in research that suggests that the kinds of mechanical group activities described above are experienced by bystanders as rousing and energizing (Konvalinka et al., 2011; Novelli et al., 2013; Páez et al., 2015; Xygalatas et al., 2011). Furthermore, there is some evidence that uniformly acting groups are more likely to be perceived as an entity (Ip et al., 2006;

Lakens, 2010; Lakens & Stel, 2011) and thus as a social category. Putting these different elements together, it appears possible that outsiders can become psychologically involved in the mechanical actions of a small group, resulting in a heightened sense of solidarity[1].

If we turn to the audience's relation to a small group displaying organic solidarity, the same processes should operate. Through vicarious participation and its relational consequences, the audience may be able to develop an organic sense of solidarity. This may sound straightforward, but empirically it has not been shown and conceptually it would be a remarkable development: a small group acting organically could, through vicarious participation, unify an audience into a group with a heightened sense of solidarity that displays distinctly organic characteristics. The social structure of the larger community is thus modelled on the characteristics that the small group at its centre displays. Confirming this hypothesis would demonstrate that small group dynamics can influence much larger social groups. There is an implicit assumption in research on group formation that the formation of bonds between group members depends on the establishment of some form of interdependence and in particular on their ability to develop lasting relations through social interaction, which is only possible in small groups with some form of continuity (Dunbar, 1993; Gaertner et al., 2006; Hill & Dunbar, 2003; Postmes, Spears, et al., 2005; Swaab et al., 2008). If small groups displaying organic behaviour can indeed evoke solidarity in the audience, this breaches the confines of small, interdependent, social groups. It raises the possibility that very large groups can adopt at least some of the characteristics of the small, interactive, group (cf. Jans et al., 2011).

Dance as a cultural expression of community

We have noted that displays of solidarity are often nonverbal: group members infer the characteristics of their groups from the (embodied) collaborations they engage in (Koudenburg, Postmes, et al., 2017b; Koudenburg et al., 2015). Thus, there were pragmatic reasons for consulting choreographers and dancers on

1 Processes such as these are likely to occur as long as this group is not explicitly categorized as an out-group from the outset. Out-group categorization may heighten observers' motivation to remain distinctive (Jetten, Spears, & Postmes, 2004; Postmes, Haslam, et al., 2005), and may accordingly reduce vicarious participation.

how to express different forms of coordination in a small group. We therefore collaborated with a dance company that consists of behavioural and movement experts. More importantly, there are conceptual reasons why dance is an exceptionally well-suited medium to examine our hypothesis. Anthropological and sociological research has pointed out that dance, as an art form, has important cultural and community functions, in particular for the expression and enhancement of social relations (Beeman, 1993; Evans-Pritchard, 1928). Moreover, dance appears to be universal across time and cultures (Brown, 1991; Spencer, 1985). This points to the overarching importance of body language for people. We inferred from this that dance could be an ideal medium for investigating our questions concerning the process by which connections between audience and performers emerge. Moreover, the art form of dance is likely to be a high-impact stimulus. And the theatre setting provides a controlled environment with high ecological validity if one is interested in doing research on audience involvement.

Studying the relationship between performers and audience is also interesting from an artistic perspective. Performing arts can be thought provoking or entertaining, but its social impact has, as far as we know, never been empirically tested. We believe that the artistic and the social evaluation of performance go hand in hand. That is to say, how people evaluate art may not only determined by its aesthetic qualities, but also by the social interpretation of what one perceives. As such, the social aspect of a performance can play a key role in the art experience and evaluation, leading to more positive evaluations when art displays solidarity (vs. no solidarity).

Overview of the research

Putting the different elements together, prior research suggests that it is possible for groups to embody organic and mechanical solidarity, as well as act as an aggregate of individuals. Furthermore, observers should be able to interpret the different forms of solidarity that a group of dancers displays on stage and should experience solidarity in line with what is displayed. To test this, we conducted two field experiments and one lab experiment in which audiences watched dance performances (live in the field experiments and on screen in the lab). In the dance performances, the behavioural patterns of the

dancers reflected either organic solidarity, mechanical solidarity, or dancers operated as an aggregate of independent individuals. We collaborated closely with choreographers in order to develop, and have experimental control over, the performances. Each performance was kept identical in terms of performers, music, light, costume, and length. We also tried to eliminate any confounds, by attempting to keep constant the amount of visual contact with the audience, facial expressions, the presence of overtly positive or negative gestures, and so on. We ensured that the dancers did not breach the so-called 'fourth wall' that separates audiences from performers: Audiences were forced to take a 'passive' role as observer and were unable to physically partake in the activities on stage.

The aim of the three experiments was, firstly, to explore whether the theories about group formation could be set in motion; i.e., could mechanical and organic solidarity be translated into dance, and would audiences be able to distinguish the different behavioural patterns? The first set of hypotheses was related to audience *perceptions*: We hypothesized that audiences should be able to distinguish between dancers expressing solidarity compared to dancers expressing no solidarity (Hypothesis 1a). Furthermore, we hypothesized that audience members differentiate between the different types of solidarity because they perceive more personal value of individual dancers when observing organic solidarity compared to mechanical solidarity (Hypothesis 1b). The second set of hypotheses was related to *emerging bonds* between audience and dancers: Here, we hypothesized that audiences experience more solidarity when they observe solidarity than when they observe individuals (Hypothesis 2a). Moreover, we believe that the process of experiencing solidary differs depending on the solidarity observed; we hypothesize that perceptions of entitativity play a mediating role in the experience of mechanical solidarity (vs. aggregate of individuals), but that the experience of organic solidarity is mediated by both perceptions of entitativity *and* perceptions of personal value (Hypothesis 2b). The third set of hypotheses examined whether the solidarity experienced with the dancers would extend to feelings of solidarity with fellow-observers; i.e., would observing solidarity together influence the level and quality of solidarity among members of the audience? We hypothesize that observing solidarity, compared to individuals, would lead to increased solidarity (Experiment 1) and improved cooperation (Experiment 2b) among members of

the audience (Hypothesis 3). Finally, we wanted to know whether the displayed and experienced solidarity shaped artistic evaluations of the performance. We hypothesized a more positive artistic evaluation after observing expressions of solidarity than after observing individuals (Hypothesis 4a). Additionally, in line with the solidarity experienced, we expect that for mechanical solidarity a positive artistic evaluation is mediated by perceptions of entitativity, whereas for organic solidarity this is mediated by both the perception of entitativity *and* perceptions of personal value of individual dancers (Hypothesis 4b).

Experiment 1

In the first experiment, we tested the following hypotheses: When the dancers display solidarity (either organic or mechanical) compared to an aggregate of individuals, members of the audience: *perceive more solidarity* (i.e., perceived entitativity) among the dancers, *experience* more solidarity *with the dancers* (i.e., identification and belonging), experience a higher collective solidarity with the dancers, i.e., the experience of a sense of *overarching solidarity* (i.e., closeness and entitativity between audience and dancers), *experience* more solidarity *among the audience* (i.e., belonging and entitativity), and *evaluate* the performance more positively (i.e., higher evoked interest). Finally, to distinguish between the different types of solidarity, we expected the members of the audience to perceive that the individual dancer is more valued when the dancers express organic solidarity compared to mechanical solidarity or when dancers act as an aggregate of individuals.

Method

Participants

Participants were 265 audience members (173 female, 89 male, 3 unknown, M_{age} = 39.34, *SD* = 14.33) who attended one of 12 dance performances across three days during a major performing arts festival in the Netherlands in 2013. The festival attracts large and mixed audiences with visitors who regularly visit arts performances and many who rarely do so. There was a different performance for each experimental condition: dancers either acted as an aggregate of individuals (*n* = 84), or displayed mechanical solidarity (*n* = 102) or organic solidarity (*n* =

79). Each day had four time slots, and performances were counterbalanced in a Latin-square type design so that they were displayed once in each time slot[2].

Procedure and materials

Development of three choreographies

In the week prior to the festival, we explained the theoretical concepts of different types of solidarity to five choreographers of dance company Random Collision. The choreographers received a written briefing that explained the theoretical concepts and the purpose of the experiment. Organic solidarity was described as a community in which 'every individual contributes their own distinctive skills, actions, and personality'. Mechanical solidarity was described as a community in which 'collective ideas of what the group is like (or should be like) shape actions of every individual'. An aggregate of individuals was described as 'occasions in which a sense of community is irrelevant or absent' and 'although social interactions may be superficially maintained, underlying relationships are treated with indifference'[3]. Because we wanted the choreographers to develop the physical representations of the concept themselves, and we did not want to steer them in any direction, the briefing did not include examples related to physical movement, such as a marching army or line dancing.

Based on these instructions, the choreographers developed and performed three types of performances[4], i.e., each performance had the same group of five dancers. Their goal was to translate the theoretical concepts into dance performances in which the interaction between the dancers conveyed organic or mechanical solidarity, or they behaved as an aggregate of individuals. The choreographers were instructed to make each performance approximately 10 minutes long and to vary only the expression of solidarity across conditions. They were instructed to keep all other aspects as constant as possible (emotional expression, music, light, clothes, etc.). Moreover, we told them not to have direct contact or prolonged visual contact with the audience: The intention was for

2 We removed the data of 8 participants who indicated that they had seen a previous performance and 8 participants who were younger than 16 years whose parents had not given consent. By Dutch Law, people aged 16 and over do not require parental consent.

3 The full briefing is included in the supplementary material.

4 For an impression of the performances, see https://vimeo.com/147571434 (password: ExperimentA).

dancers to express solidarity among each other on stage, not actively involving the audience. The individuals condition was operationalized as follows; all five dancers in this condition performed their own solo on stage. This meant that each dancer performed independently without ever making any sustained contact (with eyes or movement) with the others. This was intended to portray a highly individualized version of a community in which interactions (positive or negative) between individuals were avoided.

The development of the performances was left to the choreographers, but researchers did answer questions during the development process. The choreographers decided that because of the limited time frame they could not develop three choreographies. Instead, they developed a concept (essentially a method of interacting with one another on stage) within which they improvised during each performance. This meant that the four performances within one condition were never completely the same.

Performances

The performance "Experiment A" was introduced as a dance performance as well as a scientific study. Participants were unaware of the fact that there were different performances. Audience members were informed that by taking part in the experiment they gave consent for their data to be used for scientific purposes. There was no entrance fee. Performances were held in a former church building with a 12 by 10 metres stage. The audience was seated approximately two metres from the stage, either on chairs or on large beanbags, on the same level as the dancers. Audience sizes were kept deliberately small (an average of 23) to make the administration of the questionnaires manageable. Both the performance and the audience were filmed. After the performance audience members filled in a questionnaire (either in Dutch or English depending on the participants' preference). After finishing the questionnaire, the audience was verbally debriefed.

Questionnaire

The questionnaire consisted of five parts that were designed to measure several aspects of solidarity (belonging, identification, and entitativity, see also Koudenburg et al., 2015). The items presented in the questionnaire were

measured on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). It took about 15 minutes to complete the whole questionnaire. We present only the main dependent variables in this paper, but the full questionnaire and analyses of secondary variables can be found in the supplementary materials. Important to note is that the questionnaire was developed before dance rehearsals took place: The dependent variables were developed completely independently of the choreographers' decisions.

Relations among dancers

The first part of the questionnaire assessed how the audience experienced and interpreted the gestures of dancers towards each other: how was the relationship between dancers interpreted? To measure the extent to which participants experienced unity among the dancers, two items assessed *perceived entitativity* (Jans et al., 2011; Lakens, 2010; Lakens & Stel, 2011); 'I feel the dancers are a unit' and 'I thought there was a sense of togetherness among the dancers' (Cronbach's $\alpha = .87$).

We hypothesized that participants in the organic solidarity condition should perceive each dancer to be more personally valuable to the group than participants in the mechanical and individuals conditions. In order to assess this, we measured how important participants thought each individual dancer's personal value to the performance was with three items (Koudenburg et al., 2015): 'Each dancer fulfilled an important role in the performance', 'I believe each dancer was indispensable to the performance', and 'The performance would remain the same with one dancer less' (reverse coded; $\alpha = .65$).

Furthermore, we assessed whether participants thought that the dancers' movements were directed by a choreography (as opposed to spontaneous or improvised). Even though in reality all performances were improvised, we reasoned that in the mechanical condition the dancers' actions would appear to be restricted or constrained by a higher order structure. To assess this, we developed three items; 'I think the performance is directed', 'It seemed as if the dancers were told what to do', and 'It seemed as if the dancers spontaneously made their own decisions' (reverse coded, $\alpha = .75$).

Relationship with the dancers

In the second part, we measured sense of *belonging with the dancers* with three items from the Need Threat Scale (Van Beest & Williams, 2006); 'During the performance I felt as one with the dancers', 'During the performance I felt connected with the dancers', and 'I felt like an outsider when I watched the performance' (reverse coded, α = .80). Secondly, we measured *identification with the dancers* with a single item, 'During the performance I identified with the dancers' (Postmes, Haslam, & Jans, 2013)[5]. To measure whether participants *identified with all dancers equally*, two other identification items were included; 'During the performance there were some dancers I identified with more than other dancers' (reverse coded) and 'During the performance I identified with all dancers equally' (α = .69).

Relationship with the audience

In the third part, we used the same items, which were slightly rephrased to measure *belonging with the audience* (α = .83), *identification with the audience*, and *entitativity within the audience* (e.g., 'During the performance I experienced a sense of togetherness in the audience', α = .85).

Relationship between audience and dancers

The fourth part measured the relationship between audience and dancers. This was also assessed with an *entitativity* measure, this time with one additional item 'I have the feeling that the audience and the dancers were as one during the performance' (α = .90). Because we were also interested in the implicit distance between audience and dancers, we included a single pictorial measure of *closeness between dancers and audience* (cf. Aron, Aron, & Smollan, 1992; Schubert & Otten, 2002). A sequence of seven figures was shown, each consisting of two circles representing dancers and audience. In the sequence, the two circles were increasingly close until they are almost fully overlapped.

5 Throughout this paper, we have measured solidarity (among the dancers, with the dancers, and among the audience) with items from several scales (i.e., entitativity, belonging, and identification) that, in some cases are related. Previous research shows that despite being highly related, these are conceptually different measures (Jans et al., 2011, e.g., 2012; Koudenburg, Postmes, et al., 2017b; Koudenburg et al., 2015). We have therefore chosen to report them separately. To reduce the number of analyses, we aggregated the scales into one solidarity measure for the mediation analysis and in Experiment 3.

Participants indicated which of the figures in the sequence represented the relationship between the audience and the dancers.

Artistic evaluation

In part 5 of the questionnaire two items measured the evaluation of the performance indirectly by assessing the extent to which the performance evoked the audience's *interest*: 'Because of this performance my interest in modern dance increased' and 'Because of this performance I am curious about other activities of Random Collision' ($\alpha = .68$, $r = .52$).

Control variables

We were concerned that participants' level of prior exposure to performing arts would affect their social and artistic evaluation of the performance. We therefore assessed how often participants had participated in cultural activities, visited dance performances, and visited modern dance performances (these three items were aggregated into one variable *cultural behaviour*; $\alpha = .83$). As an additional check, participants indicated whether and to what extent they knew any one of the dancers on stage. Finally, participants listed their demographics (age, gender, and nationality), their ideas about the purpose of the study and any additional comments.

Results

The means and standards deviations of all the variables are reported in Table 1. Because we formulated specific hypotheses for how each of the conditions differed from the other two, we needed to define three sets of planned contrasts. Each of these sets of contrasts defines one focal comparison, and one additional orthogonal contrast. First, on a priori grounds, we were interested in the difference between the individuals condition versus the two solidarity conditions and in the difference between the mechanical solidarity condition and the organic solidarity condition. To test this, we defined two primary contrasts: Contrast 1 compared the individuals condition with the mechanical + organic conditions (individuals = -2/3, mechanical = 1/3, organic = 1/3). Contrast 2 compared the mechanical condition with the organic condition (individuals = 0, mechanical = -1/2, organic = 1/2). On two specific dimensions, we expected

either the mechanical condition or organic condition to differ from the other two conditions. Firstly, we defined Contrast 3 and 4 to examine whether perceived personal value was different in the organic condition; Contrast 3 compared the organic condition with the two other conditions (individuals = -1/3, mechanical = -1/3, and organic = 2/3). Contrast 4 was an additional orthogonal contrast that did not test an a priori hypothesis (individuals = 1/2, mechanical = -1/2, and organic = 0). Secondly, we defined Contrast 5 and 6 to examine whether directedness was different in the mechanical condition; Contrast 5 compared the mechanical condition with the other two (individuals= -1/3, mechanical = 2/3, organic = -1/3) and Contrast 6 compared the organic condition with the individuals condition for which we had no a priori hypothesis (individuals = -1/2, mechanical = 0, organic = 1/2).

Table 1. *Experiment 1: Mean and standard deviation for all measurements per condition*

	Condition		
	Individuals *M (SD)*	**Mechanical** *M (SD)*	**Organic** *M (SD)*
Relations among the dancers			
Perceived entitativity	3.82 (1.70)	5.62 (1.21)	5.60 (1.10)
Perceived personal value	4.45 (1.52)	4.65 (1.33)	5.00 (1.15)
Dancers were directed	4.70 (1.42)	5.37 (1.22)	4.56 (1.47)
Relationship with the dancers			
Belonging with the dancers	3.09 (1.45)	3.58 (1.36)	3.72 (1.47)
Identification with the dancers [single item]	3.20 (1.84)	3.14 (1.84)	3.64 (1.84)
Identification with all dancers equally	2.50 (1.43)	3.45 (1.88)	3.41 (1.60)
Relationship with the audience			
Belonging with the audience	3.50 (1.46)	3.49 (1.73)	3.22 (1.45)
Identification with the audience	2.63 (1.78)	2.83 (1.92)	2.18 (1.56)
Entitativity with the audience	3.14 (1.59)	3.15 (1.71)	3.09 (1.45)
Relationship between audience and dancers			
Entitativity audience and dancers	2.87 (1.43)	3.13 (1.45)	3.00 (1.30)
Closeness audience and dancers	2.92 (1.23)	2.90 (1.19)	2.88 (1.26)
Evoked interest and solidarity with the dancers (aggregated variable)			
Evoked interest	3.90 (1.39)	4.60 (1.41)	4.58 (1.39)
Solidarity with the dancers	3.12 (1.41)	3.47 (1.38)	3.70 (1.45)

Because participants are nested in 12 performances, the assumption of independent observations is violated. Intraclass Correlation Coefficients (ICC1's) were calculated to determine how much variance was explained by between-performance differences (Bliese, 2016). The mean ICC1 across all dependent variables was .05. Because of the nested nature of the data, and because we wanted to account for the group effect in the analysis, we conducted a multilevel analysis using the nlme-package in R (Pinheiro, Bates, DebRoy, Sarkar, & R Core Team, 2017). The one disadvantage of this multilevel approach is that the total number of performances was quite small, so it is important to note that all results reported below are all robust also in an individual level analysis (which, given the relatively small ICC values is likely to yield accurate estimates of model parameters too, see T. A. B. Snijders & Bosker, 2012). Models are presented with random intercept, but without random slopes because including random slopes did not increase the model fit in any of the models. Effect sizes were calculated with the square root of the within group residual variance (Tymms, 2004). Checks showed that 18 participants knew at least one of the dancers and for one participant this data was missing. Because excluding these 19 yielded similar significant results, we report analyses of the full dataset. More importantly, we conducted all analyses with participants' self-reported cultural behaviour as a covariate. The effects of cultural behaviour are not reported, because there were no interactions between cultural behaviour and the independent variables and because we are not interested in the main effects of cultural behaviour. Finally, we checked for outliers on each variable. There were some, but they tended not to affect the results so we report only those instances in which they had an impact.

Relations among dancers

Confirming our hypothesis (H1a), Contrast 1 showed a large effect: in the two solidarity conditions participants perceived more entitativity among dancers than in the individuals condition, $b = 1.77$, $t(9) = 9.76$, $p < .001$, 95% CI [1.36, 2.17], $d = 1.52$. As predicted, there was no difference in entitativity between the organic and mechanical conditions, $b = 0.01$, *ns*[6] (see Figure 1).

6 In response to a reviewer, we have performed additional post hoc analysis to control for feelings and appraisal of pleasantness, ease, and comfort. These analyses revealed that the effect of perceived entitativity remain when controlling for feelings and appraisal of pleasantness respectively. The outcomes of these analyses from Experiment 1 can be found in the supplementary material, Table 4 and 5. In Experiment 3 we address the reviewer's concern in a more structured and controlled manner.

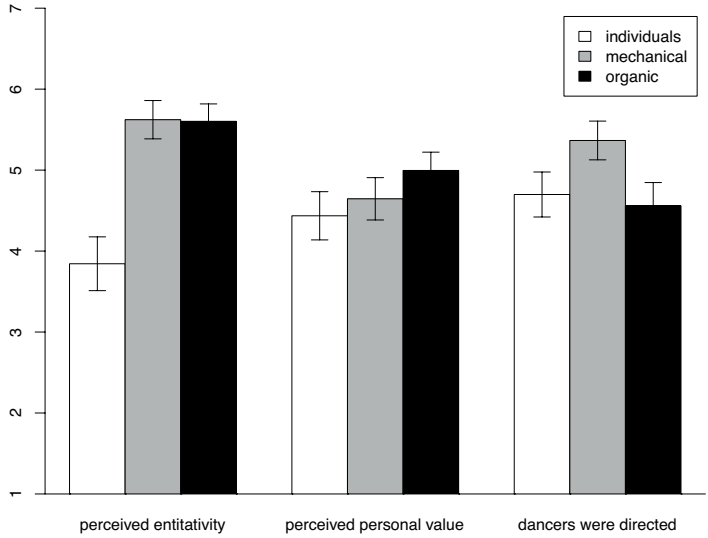

Figure 1. Experiment 1: Means and 95% confidence interval for the perception of the performance per condition.

We expected the personal value of each dancer to be higher in the organic condition, than in the two other conditions. Therefore, we used Contrast 3 and 4. We found the predicted effect with a medium effect size: Participants in the organic solidarity condition thought the dancers had more personal value to the group than participants in the individuals and mechanical conditions, b = 0.45, $t(9) = 2.45$, $p = .037$, 95% CI [0.04, 0.86], $d = 0.39$. Contrast 4 showed no effect, b = -0.17, *ns*.

With respect to the mechanical condition, we expected that mechanical solidarity would be experienced as most directed (and least spontaneous) and that organic solidarity would be rated least directed (most spontaneous). To test this, we used Contrast 5 and 6. We found a large effect for Contrast 5 that confirmed the hypothesis: the mechanical performances were experienced as more directed than the other two conditions, $b = 0.71$, $t(9) = 4.09$, $p = .003$, 95% CI [0.32, 1.10], $d = 0.61$. We found no effect of Contrast 6, b = -0.15, *ns*.

Relationship with the dancers

We expected that experiencing solidarity *among* the dancers would facilitate the audience's ability to experience solidarity *with* the dancers. To test this, we used Contrast 1 and 2 again. In line with this hypothesis, we found a medium effect for feelings of belonging (see Figure 2). Participants in the solidarity conditions experienced more belonging with the dancers than participants in the individuals condition, $b = 0.54$, $t(9) = 2.86$, $p = .019$, 95% CI [0.12, 0.97], $d = 0.46$. As expected, no difference was found in the sense of belonging between participants in the mechanical solidarity condition and participants in the organic solidarity condition, $b = 0.14$, *ns*[7].

When testing the same effect for identification, we found no evidence for a difference between the solidarity conditions and the individuals condition, or between the mechanical and organic condition, respectively $b = 0.17$, *ns* and $b = 0.51$, *ns*.

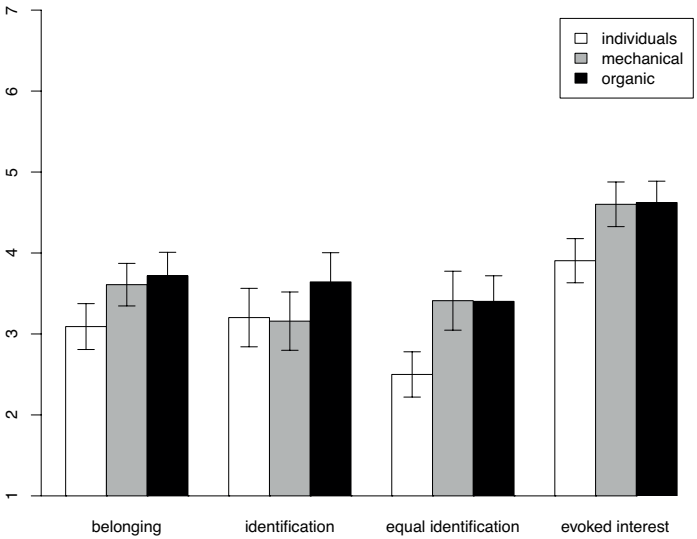

Figure 2. Experiment 1: Mean and 95% confidence interval for the relationship with the dancers and evoked interest per condition.

7 Post hoc additional analyses revealed that the effect of belonging remained when controlling for feelings of pleasantness. When controlling for appraisal of pleasantness, the effect of Contrast 1 on belonging became marginally significant, $p = .066$. For the full analyses, see Table 4 and 5 in the supplementary material.

Finally, when assessing identification with all dancers equally, a large effect was found in the hypothesized direction. In the solidarity conditions participants were more likely to identify with all dancers equally than in the individuals condition, $b = 0.97$, $t(9) = 4.44$, $p = .002$, 95% CI [0.48, 1.46], $d = 0.76$. Although we expected that observing organic solidarity would lead participants to differentiate more between the individuals in the dance group, and thus not necessarily identify with all dancers equally, we found no difference with respect to the level of identification in either condition, $b = -0.05$, *ns*.

Interestingly, we found a negative correlation between identification with the dancers and identification with all dancers equally: the more one identified with the dancers the less one seemed to identify with each of the dancers equally, $r = -.35$, $p < .001$[8]. This seems to indicate that these two variables measure something substantially different. Indeed, when one identifies with all dancers equally, it does not imply that one identifies highly with all dancers. When one identifies with all dancers equally it could also mean that one identifies equally low with all dancers. Therefore, the equal identification measure merely seems to suggest that in the solidarity conditions each dancer is socially evaluated more equally than in the individuals condition. This corresponds with a perception of unity among the dancers in the solidarity conditions.

Relationship with the audience

We also assess whether performances affected the experience of solidarity among the audience itself. There was no evidence for a difference in belonging with the audience (Contrast 1 $b = -0.14$, *ns,* and Contrast 2 $b = -0.28$, *ns*). Similarly, the level of entitativity among the audience did not differ between conditions (Contrast 1 $b = -0.05$, *ns,* and Contrast 2 $b = -0.03$, *ns*). There was also no difference in the level of identification with the audience between the solidarity conditions and the individuals condition, Contrast 1 $b = -0.11$, *ns*. Unexpectedly, there was a medium effect for the difference between the organic and mechanical conditions: Participants in the mechanical solidarity condition identified more with the audience than participants in the organic solidarity condition, $b = -0.66$, $t(9) = -2.46$, $p = .036$, 95% CI [-1.27, -0.06], $d = -0.50$[9].

8 In the individuals condition this was $r = -.35$, $p = .001$, in the mechanical condition $r = -.43$, $p < .001$, and in the organic condition $r = -.31$, $p < .01$.

9 This effect became marginally significant when participants who knew one of the dancers were excluded, $b = -0.54$, $t(9) = -2.00$, $p = .076$, 95% CI [-1.15, 0.07], $d = -0.41$.

Relationship between audience and dancers

We assessed whether an overarching solidarity had emerged between audience and dancers as a result of the performances, i.e. whether participants perceived that the audience *as a whole* felt more solidarity with the dancers. However, there were no effects on overall experienced entitativity (Contrast 1 $b = 0.23$, *ns,* and Contrast 2 $b = -0.15$, *ns*), nor on perceived closeness between dancers and audience (Contrast 1 $b = -0.03$, *ns*, and Contrast 2 $b = -0.01$, *ns*).

Evoked interest

Finally, we examined whether artistic evaluation of the performance differed between conditions. We found a medium effect for evoked interest in modern dance and Random Collision in the hypothesized direction (see Figure 2). Participants in the solidarity conditions became more interested in modern dance than participants in the individuals condition, $b = 0.63$, $t(9) = 3.46$, $p = .007$, 95% CI [0.22, 1.05], $d = 0.54$. There was no difference in interest between the mechanical and organic condition, $b = 0.01$, *ns*.

Mediation models

We hypothesised that the interpretation of the relationship between dancers would mediate the degree to which the performances would lead audience members themselves to experience solidarity with the dancers (Hypotheses 2b) *and* evoke their interest (Hypotheses 4b). Specifically, in the mechanical condition (compared to the individuals condition) we expect that solidarity with the dancers and evoked interest is mediated by perceptions of entitativity. In the organic condition (compared to the individuals condition) we expect that solidarity with the dancers and evoked interest is mediated by perceptions of entitativity *and* perceptions of personal value. We tested this with two multilevel mediation models with each two mediators, perceived entitativity and perceived personal value. Path coefficients were analyses with multilevel regressions and the indirect effects with a Sobel test (Baron & Kenny, 1986). Two dummies were created to compare the mechanical condition and the organic condition with the individuals condition (D1: individuals = 0, mechanical solidarity = 1, and organic solidarity = 0 and D2: individuals = 0, mechanical solidarity = 0, and organic solidarity = 1). Two models were analysed, one

predicting solidarity with the dancers (aggregating the identification item and belonging items, Cronbach's α = .84) and one predicting evoked interest.

The model is displayed in Figure 3. The analyses revealed that in the mechanical solidarity condition, compared to the individuals condition, experienced solidarity with the dancers was mediated by perceived entitativity (Sobel test for the indirect effect z = 2.17, SE = 0.12, p -= .030), but not by perceived personal value (Sobel z = 0.94, SE = 0.06, p = .349). In contrast, in the organic solidarity condition, compared to the individuals condition, solidarity with the dancers was mediated by *both* perceived entitativity (Sobel z = 2.16, SE = 0.12, p = .031) as well as by perceived personal value (Sobel z = 2.16, SE = 0.07, p = .030).

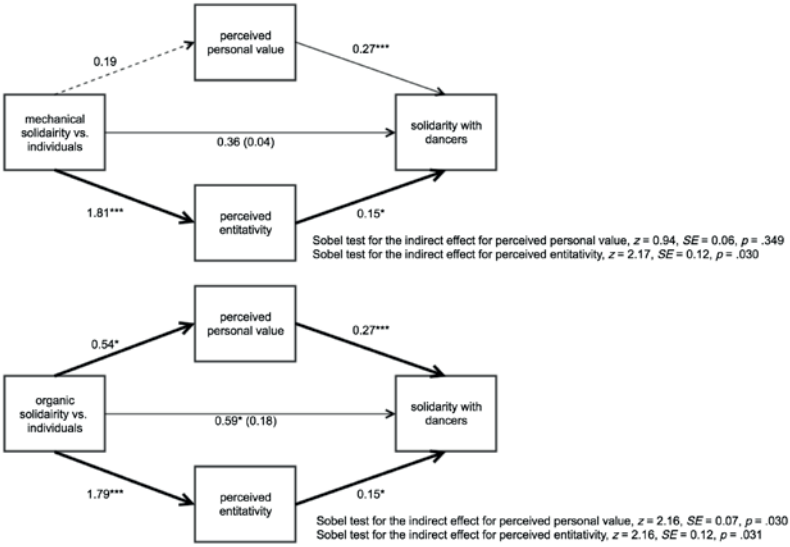

Figure 3. Experiment 1: Mediation model showing the relationship between mechanical vs. individuals and solidarity with the dancers (top) and organic vs. individuals and solidarity with the dancers (bottom), mediated by perceived personal value and perceived entitativity. Unstandardized path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. The correlation between the mediators was r = .40, p < .001. Note: * p < .05, ** p < .01, *** p < .001

For the mediation effects on evoked interest, we found a similar pattern, see Figure 4. For the mechanical solidarity condition, compared to the individuals condition, evoked interest was mediated by perceived entitativity (Sobel z = 1.97, SE = 0.12, p = .049), but not by perceived personal value (Sobel z = 0.95, SE = 0.07, p = .344). For the organic solidarity condition, compared to the individuals condition, evoked interest was mediated by *both* perceived entitativity (Sobel z = 1.96, SE = 0.12, p = .050), and perceived personal value (Sobel z = 2.30, SE = 0.08, p = .022).

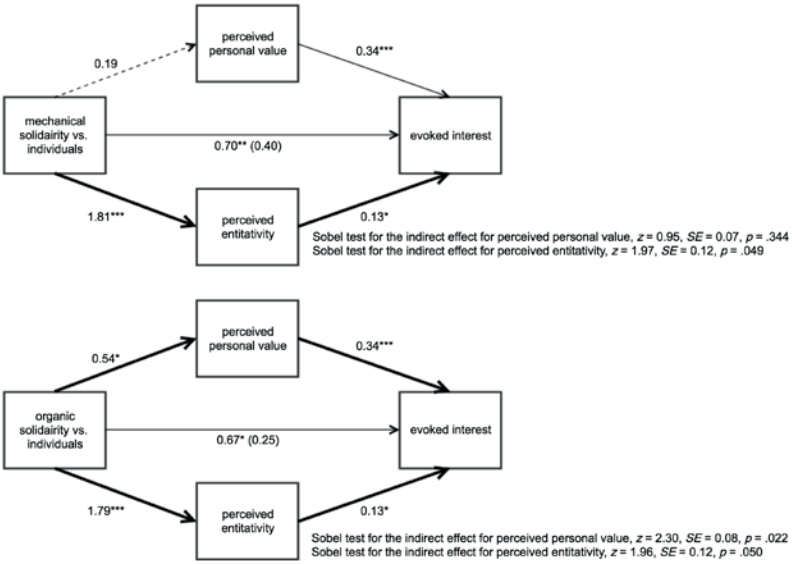

Figure 4. Experiment 1: Mediation model showing the relationship between mechanical vs. individuals and evoked interest (top) and organic vs. individuals and evoked interest (bottom), mediated by perceived personal value and perceived entitativity. Unstandardized path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. The correlation between the mediators was r = .40, p < .001. Note: * p < .05, ** p < .01, *** p < .001

Discussion

All in all, the results of this experiment were promising. Results show that it was possible to develop choreographies, which display relations that are experienced by the audience as predicted according to theories about group formation. Participants were able to distinguish between solidarity and an aggregate of individuals; they perceived more entitativity among the dancers when they observed mechanical or organic solidarity compared to when they observed individuals (Hypothesis 1a). Secondly, we wanted to determine whether participants experienced the two solidarity conditions differently. Indeed, in line with our hypotheses, participants believed that the individual dancers were more important to the group in the organic solidarity condition compared with the two other conditions (Hypothesis 1b). Moreover, participants in the mechanical solidarity condition believed the performance to be more directed. We believe that this perception of directedness was due to the audience experience that there was a top-down social structure that governed the movement of the dancers.

We also found that the nature of solidarity displayed on stage influenced the degree to which audience members experienced solidarity with the dancers. Participants in the organic and mechanical solidarity condition felt more belonging with the dancers compared to the participants in the individuals condition (Hypothesis 2a). However, we find no evidence for this pattern for identification with the dancers. Finally, the fact that participants in the solidarity conditions identify more equally with all the dancers compared to participants in the individuals condition suggests that the dancers are seen more as a unit in the solidarity conditions than in the individuals condition. Indeed, it suggests that participants in the individuals condition did not identify with the dancers as a group, although they may have identified with separate dancers individually.

The mediation analyses confirmed the hypothesis that the interpretation of the social relations displayed on stage mediated the effect of performances on audience's artistic evaluation of the performance, as well as the degree to which they felt solidarity with the dancers (Hypotheses 2b and 4b). In the mechanical performances, interest and solidarity were evoked by perceiving the dancers as an entity. But in the organic performances, solidarity and interest were also evoked by the value of individual contributions that each dancer was seen to

make to the performance. This directly confirms that the audience's experience and evaluation of the performance is mediated by the group processes displayed on stage. Moreover, this confirms that different group processes are at work in the mechanical and the organic performances.

So far there is considerable support for the hypotheses, but when we look at solidarity among the audience and the perceived solidarity between the audience *as a whole* and the dancers, there was no support whatsoever for the hypothesis (Hypothesis 3). The only result was an unexpected effect on identification with the audience, suggesting that participants in the mechanical solidarity condition identify somewhat more with the audience than participants in the organic solidarity condition—a moderate but significant effect.

Thus, though successfully manipulating the relation between audience and the dancers, the results did not provide convincing evidence that performances affected the relationship among members of the audience themselves. We retrospectively reasoned that it may have been insufficient to ask the audience to report on their feelings of solidarity with the audience, in a questionnaire straight after the performance. After all, up to that point the audience has simply been watching the show—why should this change their relationship to one another? We speculated that if participants would be given an opportunity to interact with one another after the performance, we might witness some impact of the performance on their social behaviour towards one another. We designed a second experiment that included two parts (here described as Experiment 2a and 2b) to address this issue, as well as to replicate the effects. The first part of the experiment (2a) is a replication of Experiment 1, while the second part of the experiment (2b) focuses on the consequences for social behaviour of the audiences after watching (a lack of) solidarity in a performance.

Experiment 2a

To test the robustness of the effects Experiment 2a was designed to replicate Experiment 1. Furthermore, the performances in Experiment 1 were mostly based on improvisation, making the performances within conditions slightly dissimilar. In order to solve this, we fully choreographed the performances in this experiment. In collaboration with Random Collision, three choreographers were asked to design one condition each. Finally, we gave choreographers

more time for development of the conditions, hoping that this would result in artistically more refined choreographies as well as better experimental control, all of which should result in larger effects.

Method

Participants

We collected data at the same performing arts festival in the Netherlands as in Experiment 1, albeit one year later in 2014. We had to remove eight participants who were under-aged. Data from one participant was incomplete and was removed. This left us with a sample of 371 participants who attended one of the twelve performances (249 female, 113 male, 9 unknown; M_{age} = 38.88, SD_{age} = 13.69; 324 Dutch, 31 non-Dutch, and 16 unknown). The design was the same as Experiment 1, but audiences were larger on average. There was some heterogeneity in sample sizes across conditions: aggregate of individuals (n = 106), mechanical solidarity (n = 142), or organic solidarity (n = 123).

Procedure and materials

Development of the choreographies

In this experiment, there was closer collaboration between researchers and choreographers. For artistic, practical, and time reasons we worked with three choreographers, each of whom was responsible for developing one condition. Within the time limitations it would have been very difficult for one choreographer to develop three distinct choreographies. To keep between-condition differences limited, except for the type of solidarity displayed, the three choreographers worked closely together with each other and with the researchers.

As in Experiment 1, the researchers informed the three choreographers about the distinctions between organic and mechanical solidarity and an aggregate of individuals. Each choreographer developed a choreography of approximately 16 minutes for one condition which was performed by the same four dancers. Lights, costumes, and music were also held constant over the performances. The choreographers jointly explored different possibilities in a research week, and then each developed their own performance in approximately three

weeks[10]. During this experiment, the individuals condition was operationalized slightly differently. Instead of not interacting with one another at all, this time the dancers did interact, but merely to their own advantage. Therefore, this was again a depiction of a highly individualized community, but one in which interactions were more instrumental rather than social.

Performances

The procedure was essentially the same as Experiment 1 with some small differences. Each performance was shown four times (between-subject design). Over four days twelve performances were presented in a Latin square design so that each performance was shown at least once in each timeslot. The size of the audience was on average 31 participants per performance. This time the theatre was smaller (with a stage of approximately seven by seven meters). The front row of the audience seats was as close to the stage as in Experiment 1, but there were six rows of seats on an elevation. Our expectation was that this would further increase the psychological distance between audience and dancers, making this a more conservative test of the hypotheses.

Unlike Experiment 1, participants now bought tickets (€4.00) to see a performance (unaware that there were three different ones). Seats were unassigned. As in Experiment 1, audience members filled in a short questionnaire (either in Dutch or English) after the performance, to assess the solidarity experienced in relation to the dancers. After they had finished, audience members were instructed to move to an adjacent room for Experiment 2b. In this room the group carried out a task, which was introduced as a game called "reconstruction". When this task ended, audience members returned to their seats to fill out a second questionnaire assessing the solidarity among the audience. Subsequently the audience was debriefed and got the opportunity to ask questions.

First Questionnaire

The dependent variables were roughly similar to Experiment 1, but the questionnaire was considerably shortened and split into two questionnaires

10 For an impression of the performances, see https://vimeo.com/147849401 (password: ExperimentB).

(See Experiment 2b for the second questionnaire). Again, the main dependent variables are presented in this paper, but the full questionnaire and descriptive statistics of secondary variables can be found in the supplementary materials. The first questionnaire had four parts. All scale items were measured on a 7-point scale from strongly disagree to strongly agree.

Relations among dancers

In part 1, we included the same measure of *perceived entitativity* as in Experiment 1 ($\alpha = .82$). We included two of the original three items to measure dancers' *personal value* ($r = .38$, $p < .001$).

Relationship with the dancers

In the second part, we included two of the items for *belonging with the dance group* used in Experiment 1 (connection and exclusion, $r = .33$, $p < .001$). *Identification with the dance group* was measured as in Experiment 1.

Relationship between audience and dancers

Because the results of Experiment 1 failed to show any effects on these measures, we decided to change them. We developed a new measure of *closeness* between the audience as a whole and the dance group, consisting of three items: 'I had the feeling that a bond developed between the audience and the dance group during the performance' (adapted from Leach et al., 2008), 'I had the feeling that the performance reduced the emotional distance between the audience and the dance group', and 'I experienced a sense of togetherness between the audience and the dance group during the performance' (adapted from Postmes, Brooke, & Jetten, 2008; $\alpha = .84$).

Artistic evaluation

In the fourth part, we included the same measure of *evoked interest* ($\alpha = .77$, $r = .63$). We also included two separate items to measure *evaluation of the performance* more directly: 'My overall evaluation of the performance is positive' and 'My overall evaluation of the performance is negative'. In addition, participants were asked in two open questions to describe, with a few keywords, what emotions the performance evoked and what they thought the performance was about.

Control variables

This time *cultural behaviour* was assessed with two items instead of three (participation in cultural activities and frequency of visiting modern dance performances, on a 7-point scale from never to often). We included a new measure to assess whether participants were involved with *dance* themselves ("Are you involved in dance?" with five tick boxes: as audience member, in a recreational context, an organised context, a professional context or not at all). Furthermore, participants were asked whether they had visited a previous performance by Random Collision and whether they visited the previous experiment (these data were aggregated so that participants scored 0 when they answered 'no' on both questions and 1 if either one of the answers was 'yes'), and whether and to what extent they knew any of the dancers in the performance. Participants were also asked whether they had come to the performance alone. Finally, we asked for age, gender and nationality.

Results

The means and standard deviations of all the measurement are reported in Table 2. To analyse the data, the same contrasts were used as in Experiment 1. We calculated Intraclass Correlation Coefficients (ICC1's) across all dependent variables and had a mean of .07. The data was again analysed multilevel. As in Experiment 1, the models were analysed with random intercepts, but without random slopes because this did not improve model fit. Given the small ICC's data could also have been analysed at the individual level–they would have been virtually identical to those reported below.

As in Experiment 1, we controlled for individual differences in reported cultural behaviour, dance behaviour, whether the participant came alone to the experiment or not[11], whether they knew one of the dancers. We again checked for statistical outliers and only report these when excluding them made a difference to the reported results.

11 In the individual condition 15.4% came to the performance alone, in the mechanical condition 14.2% and in the organic condition 13.6%. Because we only asked participants whether they came alone (yes/no), we were unable to identify who came with whom. Therefore, we could not include this as an additional level in our multilevel design.

Table 2. *Experiment 2: Mean and standard deviation for all measurements per condition*

	Condition		
	Individuals *M (SD)*	**Mechanical** *M (SD)*	**Organic** *M (SD)*
Relations among the dancers			
Perceived entitativity	5.03 (1.42)	5.59 (1.06)	5.67 (1.03)
Perceived personal value	4.25 (1.61)	4.04 (1.37)	4.79 (1.35)
Relationship with the dancers			
Belonging with the dancers	3.88 (1.52)	4.65 (1.26)	4.62 (1.41)
Identification with the dancers	2.98 (1.84)	3.70 (1.77)	3.69 (1.85)
Relationship between audience and dancers			
Closeness audience and dancers	2.82 (1.24)	3.68 (1.33)	3.39 (1.42)
Artistic evaluation			
Evoked interest	3.83 (1.57)	4.44 (1.34)	4.52 (1.25)
Positive evaluation	4.44 (1.64)	5.22 (1.22)	5.49 (1.20)
Negative evaluation	3.35 (1.72)	2.35 (1.36)	2.18 (1.22)
Artistic evaluation and solidarity with the dancers (aggregated variables)			
Solidarity with the dancers	3.59 (1.44)	4.33 (1.29)	4.26 (1.41)
Artistic evaluation	4.19 (1.49)	4.94 (1.17)	5.08 (1.07)

Relations among dancers

Figure 5 shows the effects of perceived relationships among the dancers. Replicating the results of Experiment 1, participants in the solidarity conditions perceived more entitativity among the dancers than participants in the individuals condition. This was a medium-sized effect, $b = 0.57$, $t(9) = 4.21$, $p = .002$, 95% CI [0.27, 0.87], $d = 0.53$. There was no difference between the mechanical and organic solidarity condition, $b = 0.08$, *ns*.

To analyse the perceived personal value to the performance we used the same contrasts as in Experiment 1. There was a medium sized effect showing that dancers in the organic condition were perceived as having more personal value than dancers in the mechanical and individuals conditions, $b = 0.65$, $t(9) = 3.96$, $p = .003$, 95% CI [0.28, 1.01], $d = 0.54$. The difference between the individuals condition and the mechanical condition was not significant, $b = 0.25$, *ns*.

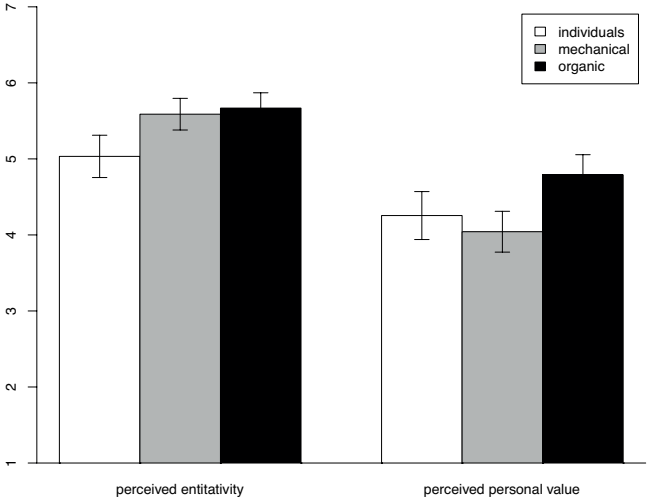

Figure 5. Experiment 2a: Mean and 95% confidence interval for perception of the performance per condition.

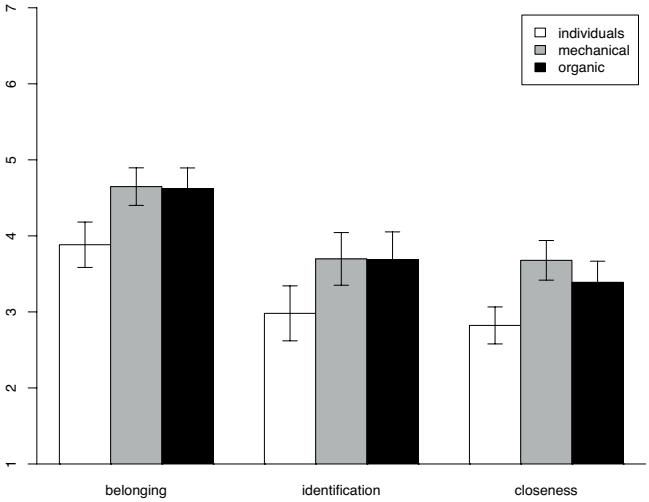

Figure 6. Experiment 2a: Mean and 95% confidence interval for relationship with the dancers per condition.

Relationship with the dancers

The results concerning solidarity of audience members *with* the dancers replicated the results of Experiment 1 (see Figure 6). A large sized effect revealed that participants in the solidarity conditions experienced more belonging with the dancers as a group than participants in the individuals condition, b = 0.81, $t(9) = 3.59$, $p = .006$, 95% CI [0.30, 1.31], $d = 0.70$. There was no difference between the two solidarity conditions, b = -0.04, *ns*. Similarly, a medium sized effect on identification showed that participants in the solidarity conditions identified more with the dancers than participants in the individuals condition, $b = 0.73$, $t(9) = 2.91$, $p = .017$, 95% CI [0.17, 1.29], $d = 0.55$. Again, no difference was found between solidarity conditions, b = -0.05, *ns*.

Relationship between audience and dancers

As mentioned in the method section, we developed a new measure to assess the closeness between the audience as a whole and the dancers. On this measure, we find the predicted effect. In the solidarity conditions there was more closeness between the audience and the dancers than in the individuals condition, a large-sized effect, $b = 0.72$, $t(9) = 4.61$, $p = .001$, 95% CI [0.37, 1.08], $d = 0.63$. There was no difference between the mechanical and the organic solidarity condition, b = -0.30, *ns*.

Artistic evaluation

Figure 7 shows a summary of the results for artistic evaluation of the performance. With respect to evoked interest, we replicated the results of Experiment 1. There was a moderate to large sized effect for the solidarity conditions to evoke more interest than the individuals condition, $b = 0.69$, $t(9) = 4.16$, $p = .003$, 95% CI [0.32, 1.06], $d = 0.59$. The mechanical and organic solidarity condition did not differ, $b = 0.11$, *ns*.

On the more direct measure of positive artistic evaluation, we found an even stronger effect. Again the solidarity conditions were evaluated more positively, $b = 0.95$, $t(9) = 6.11$, $p < .001$, 95% CI [0.60, 1.30], $d = 0.83$. We found no difference between the mechanical and the organic condition, $b = 0.29$, *ns*[12]. We found

12 Excluding participants who knew one of the dancers resulted in a marginally significant effect showing that participants in the organic condition evaluated the performance slightly more positive than participants in the mechanical condition, $b = 0.34$, $t(9) = 1.99$, $p = .078$, 95% CI [-0.04, 0.73]. However, when excluding outliers this effect disappeared, $b = 0.30$, $t(9) = 1.99$, $p = .116$, 95% CI [-0.09, 0.68].

the reverse pattern for the negative evaluation: the individuals condition was evaluated more negatively than the solidarity conditions, b = -1.13, $t(9)$ = -6.49, $p < .001$, 95% CI [-1.53, -0.74], d = -0.95. There was no difference between the mechanical and organic condition, b = -0.18, *ns*.

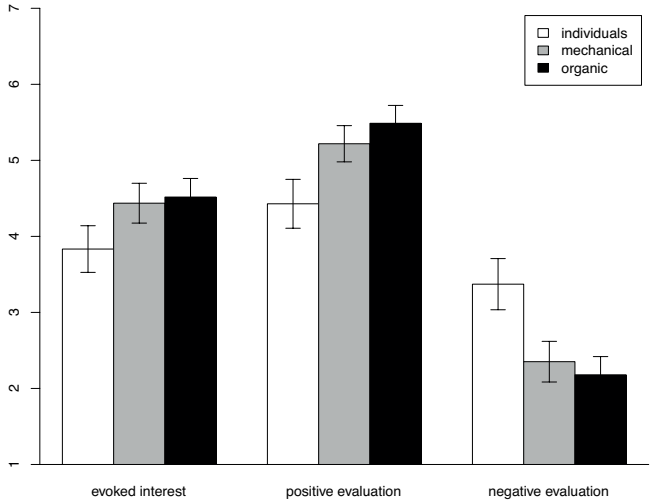

Figure 7. Experiment 2a: Mean and 95% confidence interval for artistic evaluation per condition.

Mediation models

We performed the same mediation analysis, with perceived entitativity and perceived personal value as mediators, as in Experiment 1. Two separate analyses were performed with the dependent variables: experienced solidarity (aggregating identification and belongingness, α = .71) and artistic evaluation (aggregating positive evaluation, negative evaluation (reversed) and evoked interest, α = .88). Solidarity in the mechanical condition, compared to the individuals condition, was mediated by perceived entitativity (Sobel test for the indirect effect z = 2.44, SE = 0.04, p = .015), but not by perceived personal value (Sobel z = -1.11, SE = 0.04, p = .267). The other relevant statistics can be found in the top half of Figure 8.

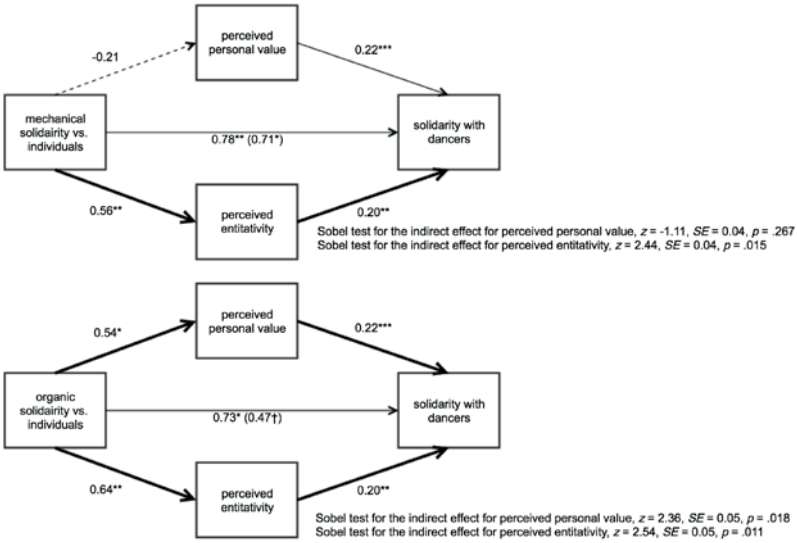

Figure 8. Experiment 2a: Mediation model showing the relationship between mechanical vs. individuals and solidarity with the dancers (top) and organic vs. individuals and solidarity with the dancers (bottom), mediated by perceived personal value and perceived entitativity. Unstandardized path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. The correlation between the mediators was $r = .25$, $p < .001$. Note: † $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

In the organic solidarity condition, compared to the individuals condition, solidarity with the dancers was mediated by both perceived personal value (Sobel $z = 2.36$, $SE = 0.05$, $p = .018$) and perceived entitativity (Sobel $z = 2.54$, $SE = 0.05$, $p = .011$, see bottom half of Figure 8).

For artistic evaluation, we also replicated the results of Experiment 1, see Figure 9. For the mechanical solidarity condition, compared to the individuals condition, artistic evaluation was mediated by perceived entitativity (Sobel $z = 2.40$, $SE = 0.04$, $p = .016$), but not by perceived personal value (Sobel $z = -1.13$, $SE = 0.06$, $p = .258$, see top half Figure 9). In the organic solidarity condition, compared to the individuals condition, artistic evaluation was mediated by both perceived personal value (Sobel $z = 2.60$, $SE = 0.06$, $p = .009$) and perceived entitativity (Sobel $z = 2.50$, $SE = 0.04$, $p = .013$, see bottom half Figure 9).

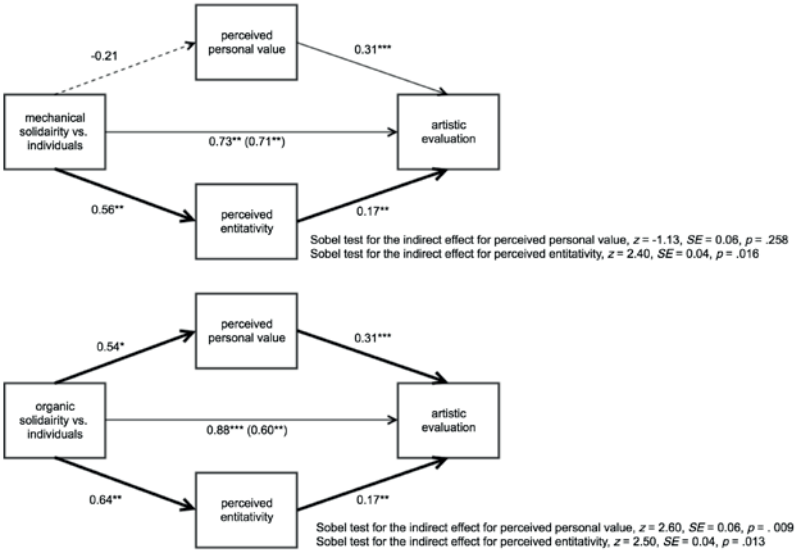

Figure 9. Experiment 2a: Mediation model showing the relationship between mechanical vs. individuals and artistic evaluation (top) and organic vs. individuals and artistic evaluation (bottom), mediated by perceived personal value and perceived entitativity. Unstandardized path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. The correlation between the mediators was $r = .25$, $p < .001$. Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Feelings evoked by the performance

To explore the answers to the open question about the feelings evoked by the performances, we categorized the words used by participants into six categories: positive valuations, negative valuations, descriptions of arousal, descriptions of structure, descriptions of chaos, and descriptions of a social nature[13]. Each word was coded for its match with the six categories: 0 if it did not match the category and 1 if it did. For example, 'affection' or 'involved'

13 We coded the words independently of condition; all words were extracted from the data and put into alphabetical order to be coded. After coding each participant was assigned a value for each category based on the number of words this participant used from that category. We also coded explicit references to expressions of non-arousal as well as antisocial or asocial references, but on these variables, there were few hits and no significant effects so we do not report them here.

were categorized as positive words as well as social words and 'playful' and 'participative' were categorized as word that were positive, arousing, and social. Words with ambiguous meaning, such as 'recognition', 'artificial', or 'delay', were not categorized in any of the categories. Subsequently a score was calculated for all the words used by participants. For instance, if they used three arousal words, they scored a 3 and if they used no arousal words, they scored a 0 for arousal. Because these count data were positive skewed, we conducted a multilevel Poisson regression using glmer from the lme4-package in R (Bates, Mächler, Bolker, & Walker, 2015). We used the same contrasts as above, again controlling for cultural behaviour, dance behaviour and whether the participants came alone to the performance or not. Again, the models with random slopes did not add significantly to the model fit, therefore, the models with random intercept only are presented.

Table 3 displays the descriptives for the number of words used per condition. In line with previous findings on the audiences' overall positive evaluation, the solidarity conditions evoked more positive feelings than the individuals condition, $b = 0.58$, $SE = 0.14$, $z = 4.16$, $p < .001$, 95% CI [0.31, 0.86]. There was no difference between the mechanical and organic condition, $b = -0.13$, *ns*. Parallel to this, the individuals condition evoked more negative feelings than the solidarity conditions did, $b = -0.51$, $SE = 0.10$, $z = -5.15$, $p < .001$, 95% CI [-0.71, -0.32]. There was also a small unexpected effect for the mechanical condition to evoke more negative feelings than the organic condition, $b = -0.27$, $SE = 0.13$, $z = -2.09$, $p = .037$, 95% CI [-0.52, -0.02].

Table 3. *Experiment 2a: Mean and standard deviation per condition for the number of words used in the answer to the open question about feelings evoked by the performance*

	Condition					
	Individuals		**Mechanical**		**Organic**	
	M	***(SD)***	***M***	***(SD)***	***M***	***(SD)***
Positive	0.61	(0.76)	1.17	(0.94)	0.99	(0.95)
Negative	1.62	(1.00)	1.12	(1.05)	0.83	(1.05)
Arousal	1.95	(1.17)	2.00	(1.30)	1.58	(1.25)
Structure	0.01	(0.10)	0.15	(0.41)	0.07	(0.26)
Chaos	0.30	(0.52)	0.19	(0.48)	0.11	(0.34)
Social	0.19	(0.39)	0.44	(0.70)	0.59	(0.84)

With respect to arousal words, there was no difference between the solidarity conditions and the individuals condition, b = -0.08, *ns*. Interestingly, a small but significant effect showed that participants described the mechanical solidarity condition as more arousing than the organic solidarity condition, b = -0.21, SE = 0.09, z = -2.20, p = .028, 95% CI [-0.39, -0.02].

With respect to words referring to structure, the results have to be interpreted with caution not just because effects were small, but also because only 28 out of the 371 participants (= 7.55%) used structure words to describe their own feelings. The solidarity conditions evoked more feelings of structure and orderliness than the individuals condition did, b = 2.41, SE = 1.02, z = 2.37, p = .018, 95% CI [0.86, 5.26]. Moreover, participants in the mechanical condition used slightly more structure words than participants in the organic condition, although this effect was only marginally significant, b = -0.67, SE = 0.40, z = -1.67, p = .094, 95% CI [-1.50, 0.09].

Parallel to this, participants in the individuals condition used more chaos words to describe their feelings than participants in the solidarity conditions, b = -0.71, SE = 0.34, z = -2.10, p = .036, 95% CI [-1.49, 0.04]. There was no difference in chaos word between the mechanical condition and the organic condition, b = -0.43, *ns*. In line with the hypothesis, participants in the solidarity conditions reported more social feelings than in the individuals condition, b = 1.05, SE = 0.25, z = 4.28, p < .001, 95% CI [0.60, 1.56]. Also, there was a tendency for participants in the organic condition to use more social words than in the mechanical condition, b = 0.32, SE = 0.17, z = 1.85, p = .064, 95% CI [-0.02, 0.66][14].

Discussion

Experiment 2a replicated the findings of Experiment 1. Even though the distance between audience and dancers was greater because of the more classical "theatre style" setup, the effects were stronger overall. This is most likely due to the fact that the choreographies included a broader range of displays of how various forms of solidarity can be embodied, because performances were longer, and because intra-condition variability was reduced. The net result was that, as in Experiment 1, the relations displayed on stage are perceived and

14 When participants who knew the dancers were excluded, the difference between the mechanical and organic condition became non-significant, b = 0.19, *ns*.

experienced as predicted. Participants perceived more entitativity among the dancers when they observed mechanical or organic solidarity compared to individuals (Hypothesis 1a). As expected, in the organic condition, the audience believed that individual dancers had more personal value to the performance than in the mechanical and individuals conditions (Hypothesis 1b).

Furthermore, after watching the mechanical performance the audience described their feelings with somewhat more structure and coherence words than after the organic performance. By contrast, in the individuals condition, compared to the solidarity conditions, the audience felt more chaotic and incoherent. This suggests that mechanical solidarity was experienced qualitatively differently than organic solidarity and the absence of solidarity. Furthermore, the presence of clear social structure and unity among the dancers in the mechanical condition seems to be associated with more feelings of arousal than the other two conditions.

The results of Experiment 1 were replicated and extended when it comes to the solidarity that the audience experienced with the dancers. As predicted, in the solidarity condition the audience felt more belonging, identified more strongly with the dancers, perceived more closeness between dancers and the audience *as a whole*, and used more social words to describe their feelings after the performance (Hypothesis 2a).

We also replicate and extend the effects of Experiment 1 on artistic evaluation. Participants in the solidarity conditions report more evoked interest than participants in the individuals condition. In addition, the solidarity performances were evaluated more positively, and less negatively (in both the scale items as well as the open questions), than the performances with an aggregate of individuals (Hypothesis 4a).

Finally, there was evidence that the process through which people experience solidarity with the dancers was qualitatively different in the mechanical and organic conditions. Mechanical performances evoke solidarity and a positive artistic evaluation through perceptions of entitativity of the dancers. But the organic performances evoke these feelings also because individual dancers are perceived to have personal value to the performance (Hypotheses 2b and 4b). This individuation of the dancers is a distinctive feature of organic performances and it plays a role in the enjoyment of the performance and the experience

of unity. Thus, mechanical and organic solidarity evoke solidarity via different pathways. Moreover, the social interpretation of the performance played a key role in the artistic impact of the piece.

Experiment 2b

In the second part of Experiment 2 we examined the consequences of observing the performances for subsequent social behaviour among the audience. Social behaviour was measured by filming the interaction between audience members during a cooperative task. Previous research shows that synchronous movements foster cooperative behaviour (Reddish et al., 2013; Valdesolo et al., 2010; Wiltermuth & Heath, 2009). If we apply this to the observer, this suggests that mechanical solidarity is most likely to evoke cooperative behaviour in an audience. However, we believe that cooperative behaviour can also emerge more organically. Therefore, we hypothesize that observing organic solidarity also fosters cooperative behaviour, but that the way in which this cooperating emerges may be different; i.e., a more bottom-up process. In other words, we predicted that audiences who had seen mechanical solidarity would choose to organise themselves in an explicit manner (i.e., first organise, then act), whereas audiences who had seen organic solidarity would organize themselves through a more interactive process (act and organise when this becomes necessary). We believed that audiences who had seen an aggregated of individuals perform, would lack the sense of social structure necessary to cooperate successfully with one another.

Method

Procedure and materials

After filling in the questionnaire in the theatre (Experiment 2a), the audience was asked to go into a different room for a group task. In this room a still life, a collection of objects placed in a certain way, was created. When the audience had entered the room, they received the task instructions via a voice-over (in Dutch and English). The goal of the task was to move the still life from one side of the room to the other side of the room. The participants had five minutes to complete this task; the start and end was signalled by the sound of a bell. The only rule in this task was that as soon as one had touched an object this person was not allowed to move his/her feet anymore. The task thus required that participants coordinated their efforts in order to complete the task. The proceedings were filmed from two cameras on the ceiling.

Results

Thirteen coders – blind to condition – were asked to the rate the level of structure in the group on a scale from 1 (= completely unstructured) to 7 (= completely structured) of screenshots (in random order) from the video data[15]. The interrater reliability was very high, ICC(2,13) = .91 (LeBreton & Senter, 2008; McGraw & Wong, 1996). Screenshots were provided from every group every 10 seconds until 3 minutes into the task (we suspected the remaining 2 minutes to be less interesting because the rules of the task forced participants to move less and less over the course of the task). Figure 10 shows the pattern of structure over time for each condition[16]. Repeated measures analyses were performed using nlme package in R (Pinheiro et al., 2017). To analyse the data the same two contrasts were used as in Experiment 1 and 2, distinguishing the two solidarity conditions and the individuals condition (Contrast 1) and the organic and mechanical condition (Contrast 2). Both contrasts, time, and

15 For an impression of this video data, see https://vimeo.com/149382701 (password: Reconstruction).

16 Due to technical problems, the voice-over instructions did not work for one of the groups. Even though this group eventually did the task too, we decided to exclude these data from the analysis. Furthermore, data collection from the coders went via an online questionnaire, unfortunately some time points were not rated and are therefore missing. This missing data included the first 60 seconds of one of the groups in the organic condition and two other time points in the organic and mechanical condition.

the interaction between each contrast and time were included in the model. The analysis revealed that the main effects for the contrasts and the interaction effect between Contrast 2 and time were not significant, all *t*'s < 1.57. The main effect for time was significant: groups became more structured over time, b = 0.05, $t(176) = 4.65$, $p < .001$, 95% CI [0.03, 0.08]. We found a significant Contrast 1 by time interaction: in the mechanical and organic conditions, structure increased more strongly over time than in the individuals condition, $b = 0.06$, $t(176) = 2.46$, $p = .015$, 95% CI [0.01, 0.11]. The model fit with the contrasts and interaction terms was significantly better than the model with time only, ΔAIC = -1.52, *logLikelihood ratio* χ^2 (4) = 9.52, $p = .049$.

Figure 10 suggests that the pattern of structure between the three conditions differs per phase. For the first phase – 10 to 50 seconds – there seems to be an increase in structure for the mechanical condition, but not so much for the organic and individuals conditions. The second phase – 60 to 110 seconds – seems to lack a clear pattern. However, the last phase – 120 to 180 seconds – suggests relatively little increase in structure, but a higher stable level of structure in both the mechanical and organic conditions compared to the individuals condition. To test whether these patterns per phase were statistically significant we performed post hoc exploratory analyses[17]. Therefore, the three time phases were analysed separately. Based on the visual inspections we expected to find a difference between the mechanical condition and the other two conditions but no difference between the organic and the individuals condition for the first phase. Therefore, we used two different contrasts; Contrast 5 compared the mechanical condition with the other two (individuals= -1/3, mechanical = 2/3, organic = -1/3) and Contrast 6 compared the organic condition with the individuals condition (individuals = -1/2, mechanical = 0, organic = 1/2). Here, we analysed the model without the time by contrast interaction terms because the model with the interactions terms did not add significantly to the model fit compared to the model with the main effects only, $\Delta AIC = 1.71$, *logLikelihood ratio* χ^2 (2) = 2.29, $p = .318$. In line with our reasoning, we found that the mechanical condition was more structured in the first phase than the individuals and organic conditions, $b = 1.05$, $t(7) = 3.36$, $p = .012$, 95% CI [0.44, 1.66]. The difference in

17 In order to verify the observed patterns in these phases we performed statistical test on the data. However, please note that the outcomes of these analyses should be interpreted with caution because the phases were based on post hoc inspection of the data.

structure between the organic and the individuals condition was not significant, b = -0.07, *ns*. Moreover, groups became significantly more structured over time, b = 0.25, $t(39)$ = 3.11, p = .004, 95% CI [0.09, 0.41].

For the second phase, we found no significant main or interaction effects, all $|t|$'s < 1.68. Here, there was considerably more variability in each of the conditions—something which may have been an artefact of the coding instructions (see discussion). In phase 3, however, clear between-condition differences appeared to exist. Because on the basis of visual inspection we expected both the mechanical and the organic condition to be more structured compared to the individuals condition, we used the same contrasts as above (Contrast 1 and Contrast 2). The interaction terms did not improve the model fit significantly, ΔAIC = 3.79, *logLikelihood ratio* χ^2 (2) = 0.21, p = .901, and were therefore excluded from the model. In line with our reasoning, we found that the mechanical and organic conditions were more structured in phase 3 than the individuals condition, although this effect was only marginally significant, b = 1.16, $t(8)$ = 1.96, p = .085, 95% CI [0.001, 2.31]. There was no difference between the mechanical and the organic condition, b = 0.002, *ns*. Furthermore, the overall structure increased over time in phase 3, b = 0.09, $t(75)$ = 3.26, p = .002, 95% CI [0.03, 0.14].

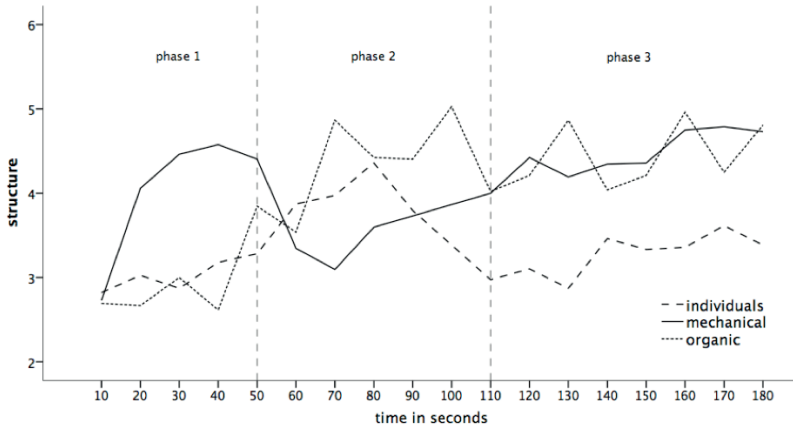

Figure 10. Experiment 2b: Structure over time during first three minutes of the task aggregated per condition.

Discussion

The exploratory analyses of the behaviour during the post-performance task revealed an interesting pattern; audiences in the mechanical condition appeared to be able to organize themselves very quickly. In contrast, audiences in the organic condition were able to organize themselves to the same extent, but this took longer to establish. In the individuals condition audiences were overall less structured than the other conditions, as they may have internalized the chaotic experience of the performance.

Surprisingly, we found no effects in the second phase. Structure appeared to differ substantially over time with increases and decreases in amount of structure in only a 50 second time frame. This phase 2 variability may have been a result of the coding method; coders merely rated screenshots in random order of all the videos. Phase 2 was the time frame in which participants moved object through space. As a result, the space often appeared cluttered from above; several objects in space and participants stretching to reach out to or pass on objects. We believe some of the richness of information obtained when tracking a group's behaviour frame-by-frame is lost when merely judging randomly ordered single frames.

Experiment 3

The main aim of the third experiment was to replicate the findings from Experiment 2 in a more controlled lab setting. Videos from one of the performances of Experiment 2 were shown to audiences in a theatre setting. Participants were asked the same questions as in Experiment 1 and 2, but this time the setting was a research environment and all participants entered knowing they would participate in a piece of research. A secondary aim was to investigate more thoroughly what could account for differences between performances. Specifically, a reviewer suggested that the individuals condition may have conveyed to viewers that the dancers experienced discomfort, which may have led the audience to experience discomfort too. In this replication, we therefore assessed perceptions of discomfort among the dancers and experiences of personal discomfort in order to establish whether either could explain audiences' subsequent social perceptions and feelings.

Method

Design and power analysis

The design of the study is essentially a one-way design with three conditions (individuals, mechanical and organic solidarity performance). But we displayed videos of performances in a high-quality theatre with 14 seats. Individual audience members are therefore nested in viewing sessions, requiring a multilevel analysis. There are no off-the-shelf solutions for power calculations with multilevel models. We therefore decided to simulate the data based on the results of experiment 2 (using the simulate.Mermod function in the lme4 package, version 1.1-13, with 5000 simulations). Simulations suggest that power to replicate the effects on belongingness would be .87 with $N = 126$ (an average of 6 participants in 21 viewing sessions) and .91 with $N = 147$ (an average of 7 participants per session). We aimed to recruit 126 participants or more.

Participants

One hundred and forty-five participants were recruited (M_{age} = 21.58, SD_{age} = 2.88, 79 female, 65 male, 1 did not indicate a gender) and participated for course credit or a monetary reward of €8. The experiment was conducted in English and the sample was international, but most participants were either Dutch (31 participants and 1 Greek/Dutch) or German (65 participants and 4 German and other nationality). All but one participant indicated that they were students (mostly psychology, 111 participants) and all indicated having good English language proficiency.

Participants viewed the videos in 21 small groups of, on average, about 7 participants. Groups were randomly assigned to one of three conditions; organic solidarity ($n = 46$), mechanical solidarity ($n = 52$), and individuals ($n = 47$). Each condition consisted of seven groups.

Procedure and materials

Participants were invited to a theatre with a large screen and 14 seats (the Reality Theatre at the University of Groningen, http://www.rug.nl/society-business/centre-for-information-technology/research/hpcv/faciliteiten/realitytheatre). Participants watched one of the three videos of the dance performances from Experiment 2a.

After the viewing, the participants were asked to complete an online questionnaire which was similar to Experiment 1 and 2. All items were answered on a seven-point scale. At the end, several demographic questions were answered. For ease of reading, we present only the variables of main interest in this paper. For the full questionnaire as well as descriptive statistic of the other variables, we refer to the supplementary materials.

Experiences and perceived discomfort

In the first section of the questionnaire participants were asked to indicate to what extent they felt (dis)comfort during the performance and to what extent the dancers appeared to experience (dis)comfort. We used a semantic differential approach with two items with anchors on each side of a 7-point scale; 'I felt unpleasant, not at ease, uncomfortable' versus 'I felt pleasant, at ease, comfortable' and 'The dancers were unpleasant, not at ease, uncomfortable' versus 'The dancers were pleasant, at ease, comfortable' (adapted from Osgood, Suci, & Tannenbaum, 1967).

Relations among dancers

In section 2, we measured *perceived entitativity* among the dancers and *perceived personal value* of each dancer as in the previous experiments ($\alpha = .84$ and $\alpha = .77$ respectively).

Relationship with the dancers

In section 3, a single item was included to measure *identification with the dancers* (Postmes et al., 2013). Furthermore, similar to Experiment 1, three items measured to what extent the participants felt a sense of *belonging* to the dance group (Van Beest & Williams, 2006). As in previous studies, inter-item correlations were very high and results for separate scales were very similar. Accordingly, the four items were aggregated into one solidarity measure (last item from belonging reverse coded, $\alpha = .88$).

Relationship with the audience

In section 4, a single item for identification, two items for belonging, and one item for entitativity, were included to measure the extent to which participants

felt *solidarity with the audience group*. These four items (identification, belonging and entitativity) were aggregated into one solidarity measure (α = .89).

Evaluation of the performance

In section 5, four items measured whether the dancers were perceived as *directed*, to assess whether, with choreographed performances, we would find the same pattern as with the improvised performances from Experiment 1 (now including a fourth item 'I think the performance was improvised', α = .77). To measure the participants' *evaluation of the dance performance*, three items were included; 'I thought the performance was well executed', 'I enjoyed the performance', and 'I thought the movements of the dancers looked professional' (Cronbach's α = .76). Another three items measured whether the performance *evoked interest* in dance; 'Because of this performance my interest in modern dance increased', 'I would like to see this performance live', and 'I would like to see other work from these dancers' (α = .88).

Control variables

Lastly, demographic information was asked. First, cultural behaviour was measured as in the previous experiments (α = .73). Two items measured to what extent they knew any of the dancers or the fellow participants on a scale from 0 (not at all) to 4 (very good) (answering for the person they knew best). Because only three participants seemed to know (one of) the dancers barely to somewhat, this variable was disregarded in the analyses. Some control questions asked participants whether they already knew or had heard about the performance that was performed a couple of years earlier in Groningen. Two participants indicated that they had heard about the performance before. Most importantly, no participants indicated that they had seen the performance. Finally, we asked the participants their age, gender, nationality, study, English proficiency (speaking, reading, and listening on a 7-point scale, α = .83) and what they thought the purpose of the study was.

Results

The aim of this experiment was to replicate the findings and to assess whether the effects found in the individuals condition could be explained by

the unpleasant experience of viewing this performance. Data were analysed using the same sets of contrasts as in Experiment 1 and 2. The mean Intraclass Correlation Coefficients across the dependent variables was .08. Again, data was analysed multilevel[18] with random slopes but fixed intercept (because including random intercepts did not significantly improve the model fit).

As in the previous experiments, we controlled for cultural behaviour[19]. We reported data without removing outliers because, overall, removing outliers did not affect the results. In case removing outliers did alter the results, this is mentioned.

Relations among the dancers

In line with our hypothesis, we found that participants in the solidarity conditions perceived more entitativity among the dancers in the video than participants in the individuals condition. This was a large-sized effect, $b = 0.85$, $t(18) = 3.63$, $p = .002$, 95% CI [0.37, 1.34], $d = 0.74$. There was no difference between the mechanical and organic solidarity condition, $b = 0.18$, *ns*.

To analyse perceived personal value, Contrast 3 and 4 were used. A large-sized effect showed that participants in the organic condition perceived more personal value among the dancers than participants in the other two conditions, $b = 1.16$, $t(18) = 5.10$, $p < .001$, 95% CI [0.69, 1.64], $d = 1.04$. We found no difference between the participants in the mechanical and participants in the individuals condition, $b = 0.12$, *ns*.

Finally, directedness was analysed using Contrast 5 and 6. We found no evidence for a difference between participants in the mechanical and the other two conditions, $b = 0.09$, *ns*. Nor was there a significant difference between the participants in the organic and participants in the individuals condition, $b = 0.43$, *ns*. This finding is not surprising given that the performances from Experiment 2 were all choreographed and thus should look equally directed (as opposed to the improvised performances from Experiment 1).

18 Unilevel analysis yielded almost identical results.

19 In this experiment participants signed up independently of one another. Some participants knew each other beforehand, but only 10.3% (6.4% in the individuals condition, 15.3% in the mechanical condition, and 8.7% in the organic condition) knew another participant good to very good (the remaining 24.2% knew someone barely or somewhat). Controlling for previous acquaintance between participants did not alter the results, therefore we did not control for this in the analysis described in this paper.

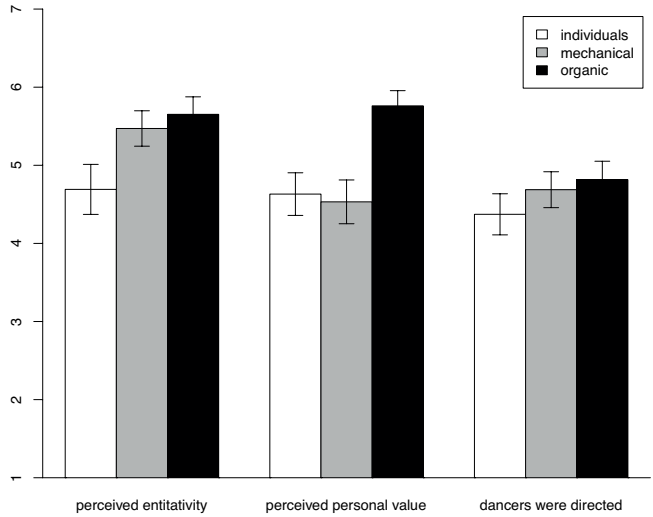

Figure 11. Experiment 3: Means and 95% confidence interval for the perception of the performance per condition.

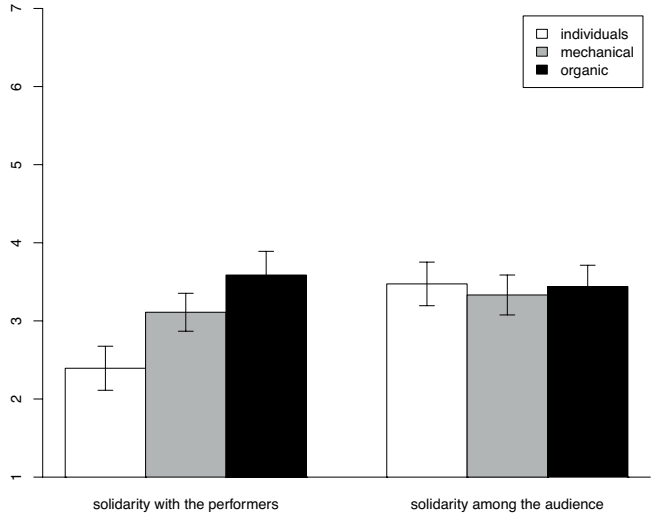

Figure 12. Experiment 3: Mean and 95% confidence interval for the relationship with the dancers and among the audience per condition.

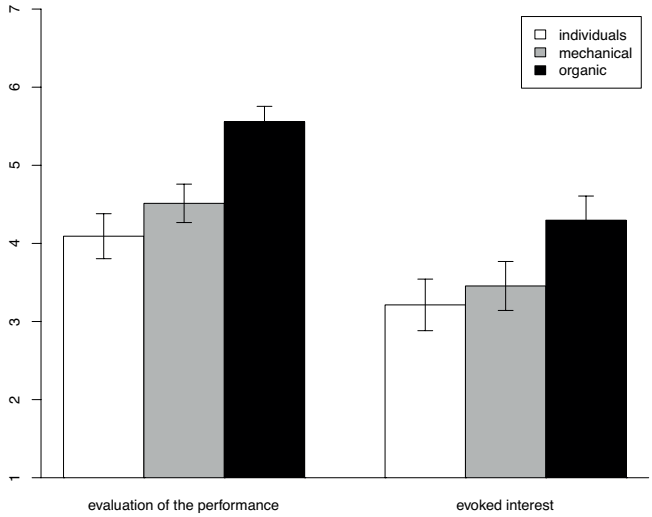

Figure 13. Experiment 3: Mean and 95% confidence interval for artistic evaluation per condition.

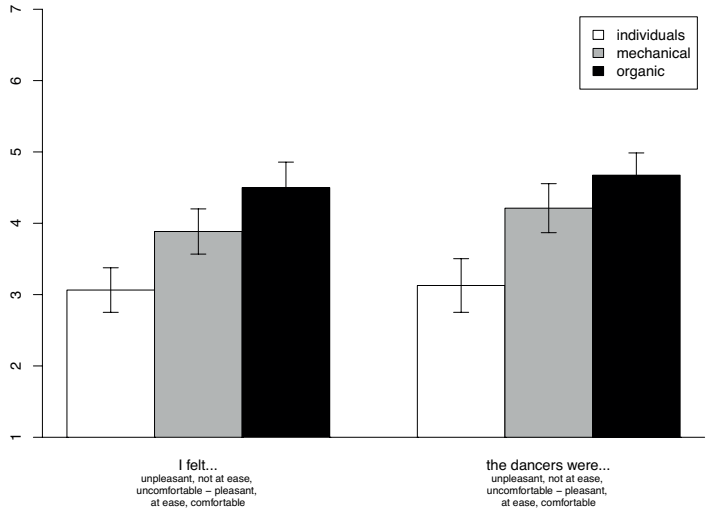

Figure 14. Experiment 3: Mean and 95% confidence interval for affect, appraisal and attitude of pleasantness per condition.

Relationship with the dancers

In line with our hypothesis, we found a large effect showing that participants in the solidarity conditions experience more solidarity with the dancers than the participants in the individuals condition, $b = 0.95$, $t(18) = 3.50$, $p = .003$, 95% CI [0.39, 1.52], $d = 0.81$. As expected, we found no difference between the participants in the mechanical and participants in the organic condition, $b = 0.11$, *ns*.

Relationship among the audience

Like the previous experiments, we found no effects on the relationship among the audience, all $|t|$'s < .39, *ns*.

Evaluation of the performance

As in the previous experiments, participants in the mechanical and organic condition evaluated the performance better than participants in the individuals condition, $b = 0.94$, $t(18) = 4.18$, $p < .001$, 95% CI [0.47, 1.40], $d = 0.84$. Surprisingly, participants in the organic condition found the performance better than participants in the mechanical condition, $b = 1.04$, $t(18) = 4.09$, $p < .001$, 95% CI [0.51, 1.57], $d = 0.94$. In similar vein, the solidarity conditions evoked slightly more interest than the individuals condition, although this did not reach significance, $b = 0.64$, $t(18) = 2.01$, $p = .060$, 95% CI [-0.02, 1.31], $d = 0.51$[20]. Furthermore, the organic performance evoked more interest than the mechanical performance, $b = 0.81$, $t(18) = 2.21$, $p = .041$, 95% CI [0.05, 1.56], $d = 0.64$.

Experiences and perceived discomfort

Here we looked at the different measures of pleasantness. That is, feelings and appraisal of pleasantness, ease, and comfort. As suspected, a large-sized effect showed that participants in the individuals condition felt less pleasant, at ease, and comfortable than the participants in the solidarity conditions, $b = 1.12$, $t(18) = 3.71$, $p = .002$, 95% CI [0.50, 1.75], $d = 0.87$. Also, a marginally significant effect showed that participants in the organic condition felt slightly more pleasant, at ease, and comfortable than participants in the mechanical condition, $b = 0.61$, $t(18) = 1.77$, $p = .093$, 95% CI [-0.10, 1.33], $d = 0.48$. When

20 This effect became significant when one outlier was removed, $b = 0.72$, $t(18) = 2.36$, $p = .030$, 95% CI [0.09, 1.36], $d = 0.58$.

we look at appraisal, we see that participants in the individuals condition find the dancers less pleasant, at ease, and comfortable than participants in the solidarity conditions, $b = 1.31$, $t(18) = 4.18$, $p < .001$, 95% CI [0.66, 1.96], $d = 0.99$. We found no difference in appraisal of pleasantness between participant in the mechanical and participants in the organic condition, $b = 0.46$, *ns*.

More interestingly, however, was whether these perceptions and feelings of unpleasantness affected the perceptions and feelings of solidarity. Therefore, we added the pleasantness variables to the models of perceived entitativity and solidarity with the dancers. Controlling for feelings of pleasantness, ease, and comfort, the effect for perceived entitativity remains; participants in the solidarity conditions perceived more entitativity among the dancers than participants in the individuals condition, $b = 0.75$, $t(18) = 3.05$, $p = .007$, 95% CI [0.24, 1.25], $d = 0.66$. Again, there was no difference between participants in the mechanical and participants in the organic condition, $b = 0.12$, *ns*. Furthermore, participants in the solidarity condition perceived more entitativity than participants in the individuals condition, irrespective of the appraisal of pleasantness, ease, and comfort among the dancers, $b = 0.56$, $t(18) = 2.37$, $p = .029$, 95% CI [0.07, 1.06], $d = 0.51$. No difference was found between participants in the mechanical and participants in the organic condition, $b = 0.08$, *ns*.

Moreover, we see that, irrespective of feelings of pleasantness, ease, and comfort, participants in the solidarity condition felt more solidarity with the dancers than participants in the individuals condition, $b = 0.58$, $t(18) = 2.24$, $p = .038$, 95% CI [0.04, 1.12], $d = 0.52$. There was no difference between participants in the mechanical and participants in the organic condition, $b = 0.27$, *ns*. We found the same pattern when controlling for appraisal of pleasantness, ease, and comfort of the dancers, Contrast 1, $b = 0.72$, $t(18) = 2.55$, $p = .020$, 95% CI [0.14, 1.31], $d = 0.63$, Contrast 2, $b = 0.38$, *ns*[21].

Mediation models

As in the previous experiments we performed a mediation analysis with perceived entitativity and perceived personal value as mediators on solidarity with the dancers as well as artistic evaluation (items from evaluation of the

21 Post hoc analysis of these data for Experiment 1 showed roughly the same, see footnote 5 and 6 and Table 4 and 5 of the supplementary material.

performance and evoked interest aggregated, α = .89). The results from previous experiments were partially replicated. See Figures 15 and 16 for all path statistics. In the mechanical condition, compared to the individuals condition, solidarity with the dancers was neither mediated by perceived entitativity (Sobel test for the indirect effect $z = 1.13$, $SE = 0.07$, $p = .259$), nor by perceived personal value (Sobel $z = -0.38$, $SE = 0.06$, $p = .707$), see top half of Figure 15. However, in the organic condition, compared to the individuals condition, solidarity with the dancers was, like in Experiment 1 and 2, mediated by perceived personal value ($z = 2.07$, $SE = 0.12$, $p = .038$), but again not by perceived entitativity (Sobel $z = 1.16$, $SE = 0.09$, $p = .248$), see bottom half of Figure 15.

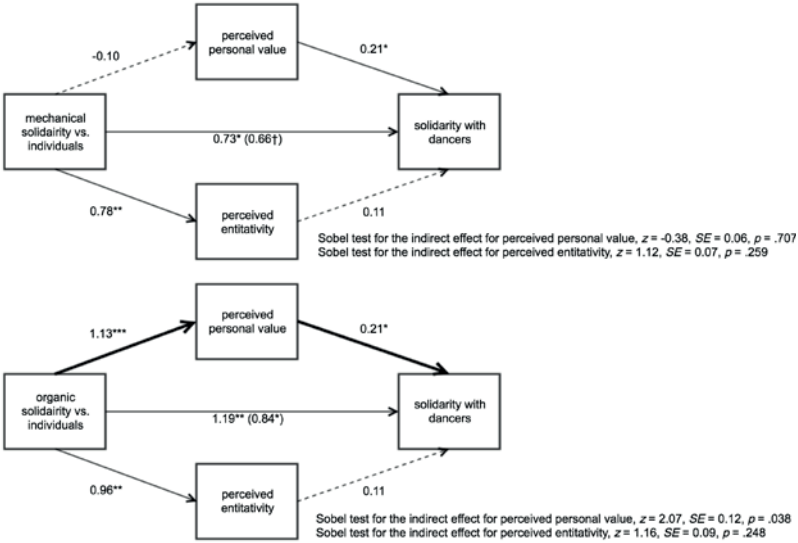

Figure 15. Experiment 3: Mediation model showing the relationship between mechanical vs. no solidarity and solidarity with the dancers (top) and organic vs. no solidarity and solidarity with the dancers (bottom), mediated by perceived personal value and perceived entitativity. Unstandardized path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. The correlation between the mediators was $r = .21$, $p = .012$. Note: † $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

For artistic evaluation, we found the same pattern; the mechanical condition, compared to the individuals condition, was neither mediated by perceived entitativity (Sobel $z = 1.13$, $SE = 0.07$, $p = .260$), not by perceived personal value (Sobel $z = -0.38$, $SE = 0.09$, $p = .705$), see top half of Figure 16. In the organic, compared to the individuals condition, condition, again, artistic evaluation of the performance was mediated by perceived personal value (Sobel $z = 3.00$, $SE = 0.13$, $p = .003$), but not perceived entitativity (Sobel $z = 1.15$, $SE = 0.08$, $p = .249$) see bottom half of Figure 16.

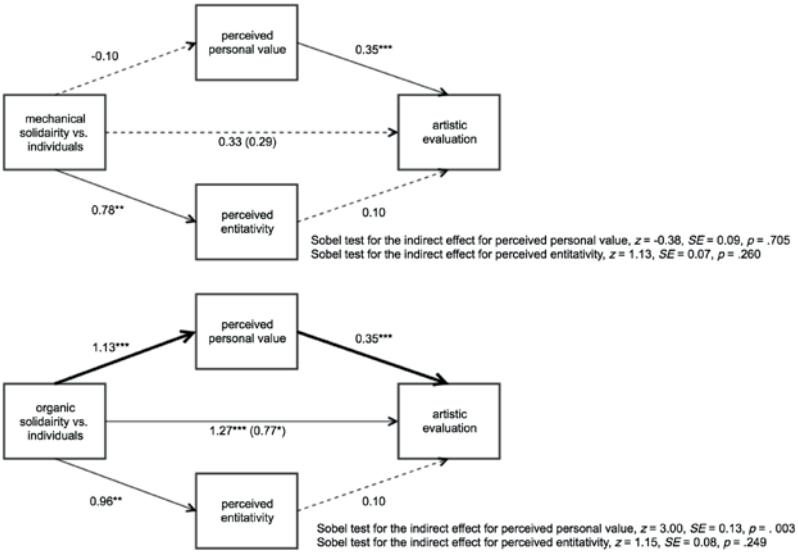

Figure 16. Experiment 3: Mediation model showing the relationship between mechanical vs. no solidarity and artistic evaluation (top) and organic vs. no solidarity and artistic evaluation (bottom), mediated by perceived personal value and perceived entitativity. Unstandardized path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. The correlation between the mediators was $r = .21$, $p = .012$. Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4. *Experiment 3: Mean and standard deviation for all measurements per condition*

	Condition					
	Individuals		Mechanical		Organic	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Relations among the dancers						
Perceived entitativity	4.69	(1.63)	5.47	(1.16)	5.65	(1.14)
Perceived personal value	4.63	(1.39)	4.53	(1.43)	5.76	(0.99)
Directed	4.37	(1.34)	4.69	(1.17)	4.82	(1.21)
Relationship with audience and dancers						
Solidarity with the performers	2.39	(1.44)	3.11	(1.24)	3.59	(1.55)
Solidarity among the audience	3.47	(1.42)	3.33	(1.30)	3.44	(1.39)
I felt unpleasant, not at ease, uncomfortable - pleasant, at ease, comfortable	3.06	(1.59)	3.88	(1.62)	4.50	(1.82)
The dancers were unpleasant, not at ease, uncomfortable - pleasant, at ease, comfortable	3.13	(1.92)	4.21	(1.75)	4.67	(1.59)
Evaluation, interest, and cultural behaviour						
Evaluation of the performance	4.09	(1.47)	4.51	(1.25)	5.56	(1.00)
Evoked interest	3.21	(1.68)	3.46	(1.60)	4.30	(1.58)
Artistic evaluation [aggregated]	3.65	(1.46)	3.98	(1.30)	4.93	(1.24)

Discussion

We found that the effects for perceived entitativity, perceived personal value, and solidarity with the dancers replicated in the lab. Amazingly, even though audiences watched a video recording of performance, effects are just as large as with the live performances. This may be, in part, due to the experimental control we had in this study, but may also be a testament to the strength of these effect; i.e., a group does not need to be physically present in order for observers to be socially affected.

In addition, we found that the individuals condition causes more feelings of unpleasantness, unease, and discomfort, and the dancers in this condition are appraised as more unpleasant, uneasy, and uncomfortable. However, we

are pleased to find that neither of these explain the effects of perceptions of entitativity and solidarity with the dancers. This is important because it shows that the effects on perceptions and feelings of solidarity are not confounded by perceptions and feelings of discomfort.

Lastly, the mediation analyses are partially replicated. As in Experiment 1 and 2, perceived personal value only mediated solidarity and artistic evaluation in the organic (vs. individuals) condition, and not in the mechanical (vs. individual) condition. In this experiment perceived entitativity mediated neither solidarity nor artistic evaluation. This is due to the non-significant relationship between perceived entitativity and solidarity with the dancers. That is, experiencing solidarity with the dancers is not a result of perceiving unity among the dancers. This may be a consequence of watching the performance on screen rather than live. When the dancers are physically present, audiences may more easily feel part of the entity that they observe, thus leading to the experience of solidarity. When dancers are not physically present, the link between seeing unity among the dancers and feeling unity with the dancers, may be more difficult to establish. The solidarity experienced can therefore not be explained by perceptions of entitativity.

General discussion

What do these results tell us about the impact of art? First and foremost, we have shown that social psychological processes of group dynamics underpin the impact of performing art on audiences. The group dynamics displayed on stage by a group of dancers shape both the relationship that emerges between audience and dancers *and* it shapes the overall enjoyment of the artistic performance. The pathways that connect audiences to live performances are not just aesthetic; they are grounded in elementary social psychological processes. This finding demonstrates, we argue, that modern dance has the power to shape and transform communities.

The results of three experiments support this overarching conclusion. We proposed that the form of solidarity displayed on stage (mechanical or organic) would (a) be recognizable to the audience, (b) shape the type of solidarity that the audience develops with the dancers, and (c) transform the relationships among the audience members. All these hypotheses were confirmed.

Most straightforwardly, the forms of solidarity displayed in different dance performances were recognized and understood by the observers. Performances that expressed solidarity were perceived as more entitative than performances that did not (Hypothesis 1a). In expressions of organic solidarity, audiences recognized the individuality and indispensable contribution of each dancer (Hypothesis 1b).

Important to note is that the bond that the audience developed with the performance was influenced by the kind of solidarity on display. Audiences who saw mechanical and organic solidarity felt more identification (in Experiment 2) and more belonging with the dancers (in Experiment 1, 2, and 3; Hypothesis 2a). Importantly, this was achieved very differently when organic solidarity was displayed than when mechanical solidarity was displayed. When the dancers displayed mechanical solidarity (compared to acting as an aggregate of individuals) the audience bonded more strongly when the dancers were perceived as united (in Experiment 1 and 2, but no support was found in Experiment 3). But when the dancers displayed organic solidarity, the perception of individual value of each dancer *also* played a key role in the development of a bond between the audience and dancers (in Experiment 1, 2, and 3; Hypothesis 2b).

Finally, the artistic evaluation of the performance was coloured by the social evaluation; participants who watched different forms of solidarity on stage were more interested in the dance group and felt more positively about the performance (Hypothesis 4a). And again, there was evidence that the pathways involved were very different: only in the organic condition did the individual value of dancers matter to the overall evaluation, as expected (Hypothesis 4b). Together, these results show that different pathways to solidarity identified in prior research (e.g., Koudenburg et al., 2015), determine how 'passive' observers come to feel connected to a target group of actors on stage.

Qualitative data collected in the second experiment corroborate these findings. After watching a performance that expressed solidarity, audiences felt more positive, less chaotic and more social. Furthermore, mechanical solidarity evoked more feelings of arousal and structure and, unexpectedly, somewhat more negative feelings than organic solidarity. Finally, participants who watched organic solidarity felt slightly more social than participants who watched

mechanical solidarity. Nevertheless, this effect is small and only appears on a single measure, therefore we do not want to attach too much value to it.

We hypothesized that if we could change the relationship of the audience to the performance, we could also change the post-performance relations between audience members (Hypothesis 3). Experiment 1 and 3 found no evidence for this in a questionnaire. But when we gave the audience an opportunity to interact with each other in Experiment 2, during a game they played with each other, we found clear evidence that the performance they had seen influenced the amount of cooperation and coordination among audience members. To get a good sense of these effects, we encourage readers to watch the video materials that accompany this text.

The post-performance behaviour of the audiences who watched mechanical solidarity show clear evidence that they organized themselves quickly whereas audiences who watched organic solidarity organized themselves more gradually (more organically, in some sense), but eventually audiences in both of these conditions reached the same level of structure, over time. This suggest there may have been a bottom-up process that led to a lag in self-organization, whereas a top-down process for the audiences who watched mechanical solidarity may have resulted in a fast structure formation.

Audiences that watched the aggregate of individuals were unable to fully organize a structure, which may have been due to feelings of lack of coherence, feelings of chaos, and social confusion resulting from the performance. These results extent beyond the finding that synchrony leads to cooperation (Reddish et al., 2013; Valdesolo et al., 2010; Wiltermuth & Heath, 2009) and suggest that (a) more complex forms of coordinated interaction can promote cooperation among a group and (b) this can occur when the group merely observed these coordinated interactions.

Finally, Experiment 3 not only replicated the central findings from Experiment 1 and 2a, but also provided more insight into the interpretation of the individuals condition. Experiment 1 and 2 revealed that the individuals condition was perceived as more chaotic and was evaluated as less pleasant. Although we believe that this is inherent to a situation that lacks solidarity and social structure (and indeed the sensation of unpleasantness may well be a *consequence* of the lack of social structure in the individuals condition), a reviewer advised us

to check whether these feelings of discomfort and unpleasantness were the factor that drives all other effects. Experiment 3 was designed to test this. Results showed that, indeed, audience members felt more unpleasant in the individuals condition and also had the impression the dancers were less comfortable. However, the effects on solidarity remained when controlling for unpleasantness, confirming that this unpleasantness does not drive these effects.

Implications

The results have implications, first and foremost, for our understanding of what makes artistic expressions have an impact on audiences. Although it is very common to suggest that artistic impressions have a (positive) impact on the social cohesion of a community, it is rare to hear that art appeals because it is, itself, an expression of a sense of community. And yet that is precisely what we have shown here. Of course we should immediately hedge this claim with caveats: it is premature to generalize beyond the medium of dance, and we are in no position to compare the strength of the social (group dynamic) impact to alternative sources of impact. Nevertheless, we have shown strong and consistent evidence that the artistic appeal of a performance depends (at least in part) on the degree to which that performance expresses a sense of community.

For social psychological theorising, the results are interesting because they challenge the idea that bystanders would remain passive outsiders when they are mere spectators to an event. The results suggest that one does not have to play an active role in an interactive group in order to experience the same quality of solidarity that the actors are expressing. Thus far most research has focused on the effects of interactions - mimicry, coordination, synchrony – on the development or rapport and solidarity (Bernieri & Rosenthal, 1991; Burgoon et al., 1995; Koudenburg et al., 2015; Lakin & Chartrand, 2003; Lakin et al., 2003; Stel et al., 2008; Vacharkulksemsuk & Fredrickson, 2012; Valdesolo & Desteno, 2011). The current research shows that group dynamical mechanisms may also explain how someone who is not taking physical part in an interaction may nevertheless feel psychologically involved in the same way. This finding that group formation evolved among the audience (who are mere bystanders, in some respects) implies that new groups and possibly very large groups can

emerge from the mere observation of a small group's interactions and that this audience adopts and internalizes the qualities of the group that is perceived.

Limitations and Future Research

In this research, we focused on dance as a means of conveying forms of solidarity. The question remains whether these effects also apply to other forms of (coordinated) interactions. Given that dancers are especially good in using body language to interact and convey meaning, everyday interactions may not be as strong to have such impact on observers. However, previous findings suggest that people are able to socially interpret 'normal' interactions of others as well (Bernieri et al., 1994; Lakens & Stel, 2011), and as they are exposed to interactions on a day-to-day basis it is quite likely that observing other forms of coordinated interaction would yield similar results. Therefore, we believe the transference of solidarity is not limited to the embodied expressions of a dance group, but is actually present in many interactions, both verbal and non-verbal. With respect to the solidarity among the audience, we found no evidence of such effects in Experiment 1 and 3. The behavioural results of Experiment 2b, when we gave audience members the possibility to interact with one another, did support the hypothesis. But some caution needs to be applied when interpreting these behavioural effects: these results are based on the observation of eleven groups only. Replication of these findings with more groups is necessary to determine the stability of these effects. Nevertheless, the behavioural observations provide evidence that the solidarity experienced during the performances was internalized and affected the way audience members approached one another as well as the task.

Furthermore, the effects on experienced solidarity and artistic evaluation may have been a result of differences in quality of the performances. The performance with the aggregate of individuals may not have been as good (technically or artistically) as the other two performances. As a result, audiences were perhaps unable to connect with the performance and thus reported less solidarity and less positive (more negative) evaluations. However, we have reason to believe that this is not the case. In both experiments, the same dancers were on stage. Moreover, the performance with the aggregation of individuals from Experiment 2 actually won the 2nd prize in an international choreography

competition: even though the audience liked this performance least, according to professionals it was of high artistic quality. Finally, responses in Experiment 3 showed that audiences considered the individuals performance to be equally good, well executed and professional as the mechanical performance (although the organic performance was rated even higher)[22]. As such, we believe the effects on solidarity and evaluation cannot be explained by differences in quality of the performances.

Finally, we note that these experiments were conducted by turning live performances into stimulus material. Historically, such live performances were a staple ingredient of social psychological research (e.g., the classic experiments of Asch, Sherif, and Zimbardo all depend on it, J. R. (Joanne R. Smith & Haslam, 2012). Such setups make it more difficult to carefully control the ceteris paribus requirement. We devoted a lot of attention to this potential problem in both field experiments, and Experiment 3 was designed to specifically tackle this problem. On the basis of the consistent effects on how performances were perceived (e.g., perceived solidarity levels and perceived individual contribution of dancers) we can only conclude the manipulations were successful.

Conclusion

The current research illustrates how important performing arts can be to strengthen social ties in society. Beyond the arts, however, the research also attests to the sensitivity of humans in interpreting and internalizing the social interactions that occur in their immediate environment. This very basic ability to "read" other people's social interactions, and to internalize it into one's own psychological relations, may play a key role in a broad range of social phenomena. For instance, these principles are likely to operate in the psychological experience not just of (dance) performances, but also festivals, demonstrations, sports events, parades, collective rituals, etc. At a more fundamental level, these principles may also explain how it is possible for humans to experience strong bonds with groups that they are not an active part of: the passive bystander's experience of solidarity with a small band of actors.

22 In order not to overburden readers with statistics these results are not reported in this paper. Descriptive statistics from these measures can be found in the supplementary material.

We have shown that observers internalize the solidary displayed by actors on stage. Thus, solidarity between an interacting target group is transferred upon non-participating and inactive observers. This means that in some sense, the target group's boundaries become psychologically permeable; group growth is not only a product of actual interaction with a group or of self-categorization, but can also be a product of observing the solidarity of a group and internalizing it. In sum, social gatherings where performers and spectators come together cannot just enhance feelings of solidarity: they can shape the formation of new communities.

CHAPTER 3

Reshaping Social Structure Through Performances: Emergent Solidarity Between Actors and Observers

This chapter is based on Van Mourik Broekman, A., Gordijn, E. H., Koudenburg, N., & Postmes, T. (2018). Reshaping social structure through performances: Emergent solidarity between actors and observers. *Journal of Experimental Social Psychology*, *76*, 19–32. http://doi.org/10.1016/j.jesp.2017.12.002

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Abstract

Based on the interactive model of identity formation (Postmes, Haslam, et al., 2005) we investigate whether displays of coordinated actions foster feelings of solidarity. Participants were randomly assigned to roles of actors and observers in two experiments (N = 191 and 276). Actors performed in an "airband" in which all played air-guitar (enacting mechanical solidarity) or each member played different air-instruments (enacting organic solidarity). In the control condition actors *imagined* playing (Experiment 1) or performed individually (Experiment 2). As predicted, displays of solidarity led to elevated levels of experienced solidarity among actors and observers. As predicted, experiences of organic solidarity were mediated by having a sense of personal value to the group, whereas experiences of mechanical solidarity were not. Interestingly, exploratory evidence suggests that groups who enacted organic solidarity, remained more active throughout a subsequent behavioural task relative to other conditions. This research shows that performing arts are more than just entertainment; performing arts can bring individuals together and shape social structure.

Introduction

In social psychological terms, a performance (whether in sports, religion, culture or politics) is successful when it transforms a set of loosely connected individuals into a social entity. This may occur during a Christmas church service, the World Cup football, or the Woodstock festival. At events such as these, loosely connected people make their way to a performance for personal reasons and by personal means. But during the performance, people can come to feel connected with the performers and with each other. In terms of group dynamics this is a remarkable process: despite the fact that the performers (football players, actors, musicians, politicians) are active and the crowd is separated from them and not participating in the core actions, the actions "on stage" are capable of rousing the audience so that a strong sense of solidarity can emerge that transcends boundaries between performers and observers. This process is central to the current research: How do the coordinated actions of a set of performers affect passive observers so that a sense of solidarity emerges that transcends the boundaries between performers and observers?

Our hypothesis is that a process of psychological group formation can explain this phenomenon. That is to say, the same processes that are at play in (interactive) group formation (i.e., interactive model of identity formation; Postmes, Haslam, & Swaab, 2005), might also be able to explain how passive observers come to experience a sense of solidarity, even though they do not take active part. In this way, performers and spectators can psychologically merge into one overarching entity. In cultural research, dance, music, theatre, and other spectacles are seen as instruments which express shared identity and reinforce a sense of community among those who act and those who observe (Beeman, 1993; Evans-Pritchard, 1928; Seeger, 1994; Spencer, 1985). Thus far, empirical research has studied how participation in such events affects identification among core actors (e.g., Khan et al., 2016; Páez et al., 2015) or among people related to the actors as friends or family (e.g., Konvalinka et al., 2011; Xygalatas et al., 2013). The current research investigates emergent bonds among total strangers. The central purpose is to shed light on psychological group formation between passive observers and active performers.

We study group formation by focusing on the emergence of solidarity. Solidarity is an umbrella term for the experience of groupiness and has three

components; identification, entitativity, and belonging (see also Koudenburg et al., 2013; Koudenburg, Postmes, et al., 2017b). Identification refers to the incorporation of the group into the self-concept, entitativity refers to the unity of the group as a whole, and belonging refers to the relationship between the group and the self. Together, we think these variables can capture the psychological group formation between an active group of people and passive observers.

Two Pathways to Solidarity

In the group formation literature, the interactive model of identity formation suggests there are two pathways to forming groups (Postmes, Haslam, et al., 2005). In most groups elements of both pathways co-exist. Nevertheless, within specific situations one pathway may be dominant: Groups can deduce a shared identity from the similarities between individuals, such as pursuing the same goals or values, looking similar or performing the same actions. This similarity can form the basis for identification with a group (deductive social identity formation; Postmes, Spears, et al., 2005). Similarity can be due to shared features such as nationality, profession or politics, but also due to coordination in behaviour that is executed in a mechanical and similar way (Koudenburg et al., 2015). In groups performing such mechanical behaviour willingly and consciously, group members are essentially conforming to behavioural norms which makes individual deviation undesired. That is to say, in such groups individual differences are pushed to the background as they interfere with the similarity of its members (cf. E. Durkheim, 1984).

However, many of the groups we belong to do not arise from an overarching commonality, but instead are formed *organically* around individuals who complement one another's actions. Because of this, individuals can collaborate towards a common outcome and this can form the backbone of an emergent sense of identification too (inductive social identity; Postmes, Spears, et al., 2005). Think for example about a small community in which there is a mailman, a butcher, a farmer, etc. In such communities, the differences between the members of the group, the coordination of their (inter)actions, and the fact that individuals feel personally valuable to the group, contribute to an emergent sense of unity and solidarity (Jans et al., 2011, 2012; Koudenburg et al., 2015). In sum, although there are inductive and deductive pathways to developing

a shared identity and although the role of individual group members is very different in each, both pathways ultimately can lead to a strong sense of identification (and more broadly, solidarity) with the group as a whole. The main difference between the two pathways, is that in groups in which the bottom-up, inductive process dominates, the sense of personal value is positively related to the degree of identification and unity that group members experience (Jans et al., 2011; Koudenburg et al., 2015), whereas in groups that operate more top-down and where deductive processes dominate, it is the group as an entity that is central to the process of group formation.

Enacting Organic and Mechanical Solidarity

In the current work, we use the terms mechanical and organic solidarity in two different ways. On the one hand, when we talk about *mechanical and organic displays of solidarity* we refer to the group behaviour that gives rise to deductive and inductive group formation. So, while deduction and induction refer to the cognitive processes by which the psychological representation of the group is formed (see Postmes, Spears, et al., 2005), displays of mechanical and organic solidarity refer to the actual group dynamics: the social interactions among group members and, in the present research, their movement (see also Koudenburg et al., 2015). When we look at the physical processes, we see that the psychological experience of solidarity (identification, belonging, entitativity) can be enacted via behavioural coordination in groups. When people are asked to behave similarly, e.g., to move in synchrony, the group displays mechanical solidarity that may give rise to an emergent sense of groupiness through a deductive process (i.e., we are all behaving the same, we are as one). Conversely, when participants are asked to behave in a complementary way (e.g., they take turns performing a particular movement) they are displaying organic solidarity that may give rise to an emergent sense of groupiness which is induced from group members' personal contributions to the group (i.e., everyone is making a valuable contribution and thus we are united, Koudenburg et al., 2015).

On the other hand, when we mention the *experience of mechanical and organic solidarity* we refer to the psychological outcomes of the respectively deductive and inductive group formation process: the sense of group identification, entitativity and belonging that represent three facets of

experienced solidarity in small interactive groups (see also Koudenburg et al., 2013; Koudenburg, Postmes, et al., 2017b). On the experiential side, the key difference between mechanical solidarity and organic solidarity is that in the former individuality is in the background, whereas in the latter personal value of individual group members' contributions is central (see Figure 1 for the conceptual overview).

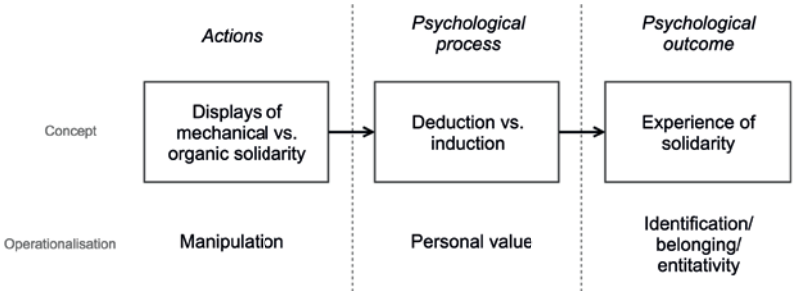

Figure 1. Overview of concepts, hypothesised process, and operationalisations.

There is a large body of literature indirectly supporting the first process: Acting in synchrony together with others leads to social bonding, (generalized) pro-sociality, and cooperation (Fischer et al., 2013b; Good & Russo, 2016; McNeill, 1995; Reddish, Tong, Jong, Lanman, & Whitehouse, 2016; Valdesolo & Desteno, 2011; Wiltermuth & Heath, 2009; and music can reinforce these effects, see Stupacher, Maes, Witte, & Wood, 2017). Strict forms of synchrony, when movements are exactly matched in time and expression can strengthen togetherness among actors. Examples are marching soldiers, dance forms such as line-dancing, or choral singing. In the army this has a clear function; you lose your sense of individuality and feel part of stronger and harmonious unit (McNeill, 1995). Collective rituals also involve synchronized movement and express a sense of community and commitment. Synchrony affects perception of unity among actors, whilst observers report that groups moving in synchrony appear to be more united (Ip et al., 2006; Lakens, 2010; Lakens & Stel, 2011; Miles, Nind, & Macrae, 2009b). Given the anthropological and cultural literature on how performing arts can instil a sense of community among actors and observers (Beeman, 1993; Evans-Pritchard, 1928; Seeger, 1994; Spencer, 1985), we believe

that mechanical expressions of solidarity among a group of performers can rouse passive audiences, too.

There is less evidence regarding the second process of the psychological effects of displays of organic solidarity. Some studies suggest that such displays can elevate experienced commitment among actors (Koudenburg, Postmes, & Gordijn, 2017a; Koudenburg et al., 2015). The research suggests that when movements are complementary, a sense of solidarity can emerge because members experience their own and others' contributions to the interaction to be valuable. Thus, in expressions of organic solidarity, individual contributions become central to experiencing a sense of unity—unity and individuality are positively interdependent (see also Jans et al., 2011; Koudenburg, Jetten, & Dingle, 2017; Postmes, Spears, et al., 2005). However, we know of no published research that examined effects of observing the expression of organic solidarity. We hypothesize that organic expressions of solidarity of a group of actors can also instil a sense of solidarity among observers.

In sum, we predict that acts of solidarity, either mechanical or organic, can reinforce the experience of solidarity among actors and observers alike, and consequently transcend the boundaries between actors and observer. For expressions of organic solidarity, compared to mechanical solidarity, we predict that experiencing personal value to the group will be central to the experience of solidarity. There is some evidence for these hypotheses with regard to the *within* group processes among actors, but little or no evidence for observers. So far, the actor-observer relationship has received very little empirical attention in group formation. In the present paper, we fill this empirical gap by using current knowledge on within group processes to explain how group boundaries can psychologically blur when observers feel solidarity in line with an interacting group. The findings from this research could make an important contribution to the field by shedding light on how groups can expand beyond the boundaries of its active members.

Current Research

In two experiments, we induced solidarity by letting actors co-act in a musical task. They were asked to perform for an audience in an imaginary band (by pretending to play "air" instruments). We manipulated enactments of

mechanical and organic solidarity by manipulating the composition of the band across conditions: all played air guitar or everyone played different instruments. Actors had to physically coordinate with each other and the music to produce a coherent performance. The task was designed to recreate a concert situation; a context in which the relationship between actors and observers is likely to be affected. However, no musical skills were required because actors played imaginary instruments. This allowed us to study performance effects among a random sample of participants who had no previous training.

In two experiments, we investigated the development of a relationship between actors, who perform in a musical task, and observers in the controlled environment of a laboratory. By studying the social impact of different forms of coordinated action among *both* actors and observers, we can compare effects on actors and observers and gain a complete picture of how relationships between actors and observers are formed. In Experiment 1, an organic and mechanical condition were compared to a control condition with no action. Experiment 2 compared these conditions with a control condition in which actors acted individually. Experiment 2 also investigated the impact of performances on post-performance behaviour of actors and observers during a joint group task[1].

We believe that observers will, in line with the actors, experience solidarity when the actors display solidarity. More specifically, we hypothesise that participants in the mechanical and organic condition will experience more solidarity than the participants in the control condition (H1a). We expect no difference with respect to solidarity between the mechanical condition and organic condition (H1b). Also, we predict that the solidarity effect will be present for both actors and observers (H2). Furthermore, we predict that actors will experience more personal value than observers (H3a). More importantly, we hypothesise that actors in the organic condition will experience more personal value than actors in the mechanical condition (H3b), whereas this effect will not be present for observers. Finally, we hypothesise that, because of the heightened sense of personal value among actors in the organic condition, personal value will mediate the experiences of solidarity in the organic condition, but not in the mechanical condition (H4).

1 We report all measures, manipulations, and exclusions in these studies. Raw data from the research is retained for a minimum of 5 years after publication and available upon request via the first author.

Experiment 1

Method

Participants

Data was collected from 191 participants (133 female, 58 male, M_{age} = 20.92, SD = 2.47)[2]. The participants were mostly (international) students from the University of Groningen (Dutch, n = 70, German, n = 95, and other, n = 26, only two participants were not a student), who participated in return for course credits or a small monetary reward. The experiment was a 2 (role: actors vs. observers) x 3 (group formation: organic solidarity vs. mechanical solidarity vs. control) between-subject design. Participants came to the lab and were allocated to a group with three to five other participants. Each group consisted of one or two observers and three to four actors. Each group was assigned to one of the three group formation conditions, organic (n = 11), mechanical (n = 13), or control (n = 11). The experiment was advertised and conducted in English so that both national and international students could participate.

Procedure and Materials

After participants entered the lab they were randomly assigned a number between 1 and 6. Each participant was placed behind a laptop with their corresponding participant number. Via a questionnaire[3] participants filled in demographic information such as gender, age, nationality, study, and English proficiency.

After the pre-questionnaire the participants received the written instructions to a musical task. Participants were randomly assigned the role of actor or observer; participant 1 and 2 were observers and participant 3 till 6 were actors. To increase comparability between conditions, participants in the control

2 The sample size was not increased after analysis. Power was calculated post hoc using the design effect to correct for the interdependence of the data (Tom A B Snijders, 2005). To calculate the design effect, we used the average ICC of the dependent variables which was .09 and an average cluster size of 5 (participants per group). The power for detecting differences between conditions with a medium effect size (f = .25) is .75.

3 The present study was part of a larger research. We only describe the measures relevant to the current paper. Measures not further reported in the paper were Individual value orientation, the Big Five Personality Inventory, some questions assessing what groups participants belonged to, need to belong, shyness, and uniqueness. Data from these measures are available via the first author.

condition got assigned to these numbers too, even though the instructions were similar for both actors and observers. Participants in all conditions were asked to stand on the numbered positions on the floor corresponding to their participant numbers. In the organic condition the actors were instructed to form an "airband" with the other actors in the group. They were asked to play imaginary (pretend) instruments together with the other actors in the group. They could pick any imaginary instrument as long as it was not the same as one of the others in the group. The observers were instructed to be the audience; they were positioned on the side line and merely observed the actors perform. In the mechanical condition actors were instructed to play "air-guitar" together; imaginary (pretend) guitars. The observers were again instructed to merely watch the actors perform. In the control condition, all participants (both actors and observers) were instructed to think about playing an instrument in a band without making actual movements. In other words, there was no role distinction in this condition. In all three conditions, the musical task was performed to "Are you gonna be my girl" by Jet (2003) and actors (in the organic and mechanical condition) were instructed to play in time to the rhythm. The experimenter first played a fragment from the song so that participants were familiar with the rhythm before they started. The experimenter left the room when the musical task was performed; the task was filmed to ensure that each group had performed the task according to the instructions.

After the task participants were seated behind a laptop to fill in the questionnaire. First, participants were asked with one item each to indicate how *comfortable* they felt during the musical task, how much *effort* they had put into the musical task, and how *difficult* they perceived the musical task to be on 10-point scale. The subsequent items were included to measure the components of solidarity (belonging, identification, and entitativity). Furthermore, personal value among the group was measured to establish whether there are different pathways to solidarity for the mechanical and organic solidarity conditions. All these items were measured on a 7-point Likert scale from 'strongly disagree' to 'strongly agree'. First, all participants were presented with questions regarding the whole group; that is, the group of actors and observers together. Five items were included to measure *belongingness* with the whole group, e.g., 'I had the feeling that I belonged to the group during the musical task.' (Cronbach's $\alpha = .79$,

Need Threat Scale, Van Beest & Williams, 2006). Ten items assessed *identification* with the group (α = .88, Leach et al., 2008). Three items measured *personal value* to the group; e.g., 'I believe I am indispensable to the group' (α = .76, Koudenburg et al., 2015).

The next items were measured among actors and observers within the experimental, but not in the control condition: Four items measured *entitativity* with the actors (measured only for actors), e.g., 'I feel there is a sense of togetherness between the other participants and me' (α = .92, Jans et al., 2011). Here 'other participants' was specified as the participant with whom actors performed in the airband. Observers in the experimental conditions, but not participants in the control condition, received similar items to measure their *perception of entitativity* among the actors, e.g., 'I feel the individuals are a unit' (α = .84, Jans et al., 2011).

Following this, every participant was asked to what extent they knew all of the other participants in the group on a 4-point scale, ranging from 1 = not familiar at all to 4 = very familiar. For each participant, we calculated a mean *acquaintance* score from this[4].

Results

Given that the participants were nested within groups, data were analysed via multilevel modelling using the 'nlme' package in R (Pinheiro et al., 2017). Two contrasts were used to compute (1) the difference between the control conditions and the experimental conditions (ψ1: control = -2/3, mechanical = 1/3, organic = 1/3) and (2) the difference between the mechanical and the organic condition (ψ2: control = 0, mechanical = -1/2, organic = 1/2). The group level contrasts and individual level role (actor or observer) plus their cross-level interaction terms were included in the multilevel model for belonging, identification, and personal value. Even though the control condition had no distinction between actors and observers, for the ease of analysis the data was treated as if it did. That is to say, even though in the control condition there was no role distinction, statistically participant 1 and 2 in this condition were

4 After this questionnaire, the groups continued with a creativity task and a decision-making task. No differences in performance on these tasks were found between conditions. Therefore, we do not present the details of this part of the research here. However, data is available via the first author.

Table 1. Means and standard deviations per condition for all dependent variables (Experiment 1).

	Condition											
	Control				Mechanical				Organic			
	Observer (*n* = 21)		Actor (*n* = 41)		Observer (*n* = 20)		Actor (*n* = 40)		Observer (*n* = 25)		Actor (*n* = 44)	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Belonging	3.65	(0.92)	3.75	(0.88)	4.06	(1.07)	4.61	(0.80)	3.53	(1.08)	4.45	(0.81)
Identification	3.69	(0.77)	3.59	(0.73)	4.16	(0.56)	4.36	(0.63)	4.20	(0.63)	4.13	(0.93)
Solidarity (aggr.)	3.67	(0.72)	3.65	(0.70)	4.13	(0.63)	4.44	(0.62)	3.98	(0.62)	4.24	(0.83)
Personal value	2.63	(1.04)	2.55	(1.00)	2.82	(0.92)	3.02	(1.17)	2.51	(1.00)	3.48	(1.21)
Entitativity	--		--		--		4.41	(1.11)	--		4.29	(1.30)
Perceived entitativity	--		--		3.88	(0.86)	--		4.13	(1.01)	--	

treated as observers and the remaining participants as actors. Furthermore, to statistically control for comfort, effort, difficulty, and acquaintance these individual level variables were included in the model. Because these variables are not of main interest, the outcomes of these variables will not be presented in this paper. Analyses were done with and without outliers. Results including all cases are presented here, but when different effects were obtained when outliers were excluded, this is mentioned[5].

Because we do not hypothesize an interaction effect between role and the contrasts for the solidarity measures (belonging and identification) – indeed, we expect the effects to occur for actors and observers alike – we tested the model fit with and without the interactions. When including the interaction terms did not improve the model, we only tested the model with main effects. For the improvement of the model fit, we used a more lenient cut-off value of $p = .10$ instead of $p = .05$ in order to not exclude interaction effects that were a result of potentially meaningful differences between effects for actors and observers. Because we were interested in comparing the size of the effect of actors and observers separately, we tested the simple main effects per role, also when the interaction term between contrast and role was not significant ($p > .10$).

Comparing the model fit with and without the interaction terms for identification showed that the interaction terms did not significantly improve the model fit, $\Delta AIC = -2.88$, *logLikelihood ratio* χ^2 (2) = 1.12, $p = .572$. The analyses without the interaction terms showed the hypothesized effect (H1a); participants in the mechanical and organic conditions identified more with their group than participants in the control condition, $b = 0.67$, $SE = 0.12$, $t(33) = 5.37$, $p < .001$, 95% CI [0.43, 0.92]. There was no difference between the mechanical and the organic condition, $b = -0.05$, *ns* (H1b). Furthermore, we found no effect of role, suggesting that there is no difference in experienced identification between actors and observers, $b = 0.06$, *ns*. To confirm test our hypothesis (H2) about the similar pattern for actors and observers, we analysed these separately. Actors in the mechanical and organic condition identify more with their group than actors in the control condition, $b = 0.67$, $SE = 0.15$, $t(33) = 4.50$, $p < .001$, 95% CI [0.38, 0.96]. As expected, there was no difference between the mechanical

5 Output from all analyses (with and without covariates) can be found in the supplementary material.

and the organic condition, b = -0.12, *ns*. As predicted, also the observers in the mechanical and organic conditions identify more with their group than observers in the control condition, $b = 0.58$, $SE = 0.19$, $t(33) = 3.06$, $p = .004$, 95% CI [0.22, 0.94]. Again, no difference was found between the mechanical and the organic condition, $b = 0.14$, *ns*.

For belonging, we found that including the interaction terms improved the model fit only marginally significantly, *ΔAIC* = 1.03, *logLikelihood ratio* χ^2 (2) = 5.03, $p = .081$. We analysed the model with the interaction terms and the simple main effects for actors and observers separately. We found a main effect of role on belonging; actors felt they belonged more with the group than observers did, $b = 0.72$, $SE = 0.13$, $t(145) = 5.53$, $p < .001$, 95% CI [0.47, 0.98]. The main effects for the contrasts and the interaction effect between the organic vs. mechanical contrast and role were not significant, all $|ts| < 1.53$, *ns*. However, we found a marginally significant interaction between the experimental vs. control contrast and role; the difference in feelings of belonging between the experimental conditions and the control condition was different for observers and actors, $b = 0.47$, $SE = 0.27$, $t(145) = 1.73$, $p = .085$, 95% CI [-0.06, 1.00]. The simple main effect showed that, in line with our hypotheses (H1a, H2), actors in the mechanical and organic condition felt more belonging than actors in the control condition, $b = 0.81$, $SE = 0.15$, $t(33) = 5.37$, $p < .001$, 95% CI [0.52, 1.11]. There was no difference between the mechanical condition and the organic condition, b = -0.05, *ns* (H1b, H2). In line with our hypothesis (H1a, H2), we find the same pattern for the observers, observers in the mechanical and organic conditions felt more belonging to their group than the observers in the control condition, $b = 0.56$, $SE = 0.26$, $t(33) = 2.12$, $p = .042$, 95% CI [0.04, 1.07]. There was no difference between the observers in the mechanical and observers in the organic condition, b = -0.43, *ns* (H1b, H2).

For personal value the model fit improved significantly when the interaction terms were included, *ΔAIC* = 3.22, *logLikelihood ratio* χ^2 (2) = 7.22, $p = .027$. We therefore analysed the model with the interaction terms. We found a main effect for role; actors feel more personally valuable than observers, $b = 0.38$, $SE = 0.17$, $t(145) = 2.23$, $p = .028$, 95% CI [0.05, 0.72] (H3a). Furthermore, we found a significant interaction effect for the organic vs. mechanical contrast and role; the difference between the mechanical and organic condition is different for actors

and observers, $b = 0.82$, $SE = 0.40$, $t(145) = 2.05$, $p = .042$, 95% CI [0.04, 1.60]. We found no evidence for any other effects, all $|ts| < 1.59$, *ns*. When we analyse actors alone, we find that actors in the mechanical and organic conditions feel more personally valuable to the group than actors in the control condition, $b = 0.75$, $SE = 0.24$, $t(33) = 3.16$, $p = .003$, 95% CI [0.29, 1.22]. More importantly, in line with our hypothesis (H3b), actors in the organic condition feel more personally valuable to the group than actors in the mechanical condition, $b = 0.57$, $SE = 0.27$, $t(33) = 2.09$, $p = .045$, 95% CI [0.04, 1.11][6]. For the observers, we found no significant effects, $|ts| < 1.06$, *ns*.

As expected (H1b) we found no difference between the mechanical and organic condition with respect to feelings of entitativity among the actors, $b = 0.11$, *ns*. Nor did we find a difference in the extent to which observers perceived entitativity among the actors, $b = 0.34$, *ns*.

Table 2. Correlations between solidarity (aggregated items of belonging and identification) and personal value per condition (Experiment 1)

Condition	Role		1.
Control	Observer	1. solidarity	___
		2. personal value	.165
	Actor	1. solidarity	___
		2. personal value	.500**
Mechanical	Observer	1. solidarity	___
		2. personal value	.192
	Actor	1. solidarity	___
		2. personal value	.289
Organic	Observer	1. solidarity	___
		2. personal value	.529**
	Actor	1. solidarity	___
		2. personal value	.654***

Note: *p<.05; **p<.01; ***p<.001

6 When outliers were deleted from the model (standardized residuals below the 2.5th and above the 97.5th percentile), this effect became marginally significant, $p = .085$.

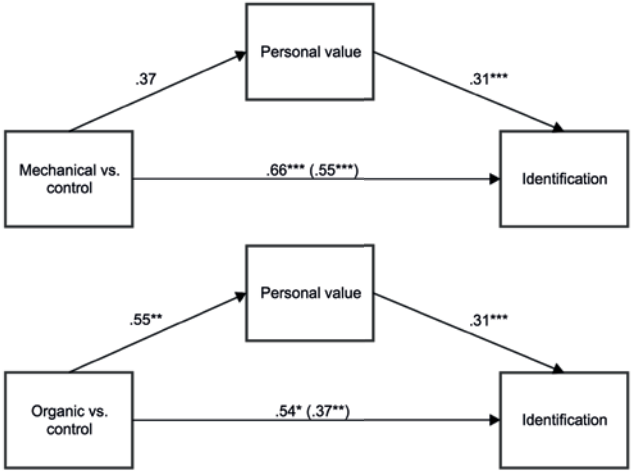

Figure 2. Mediation model showing the relationship between mechanical vs. control and identification (top) and organic vs. control and identification (bottom), mediated by personal value. Path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. The correlation between personal value and identification was $r = .50$, $p < .001$. Note: * $p < .05$, ** $p < .01$, *** $p < .001$

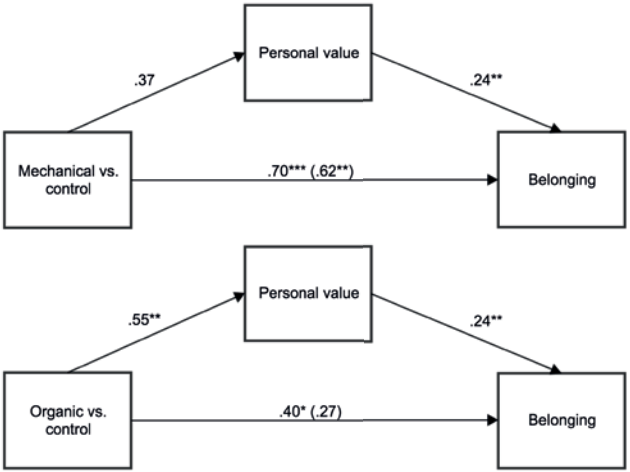

Figure 3. Mediation model showing the relationship between mechanical vs. control and belonging (top) and organic vs. control and belonging (bottom), mediated by personal value. Path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. The correlation between personal value and belonging was $r = .31$, $p < .001$. Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

Mediation

To test whether personal value mediated the relationship between the organic condition (vs. control) and the dependent variables belonging and identification (H4), multilevel mediation was performed (2-1-1 model, traditional MLM; Preacher, Zyphur, & Zhang, 2010). Two dummy codes were created to compare the mechanical condition and the organic condition with the no solidarity condition (D1: no solidarity = 0, mechanical solidarity = 1, and organic solidarity = 0 and D2: no solidarity = 0, mechanical solidarity = 0, and organic solidarity = 1).

The model for identification is displayed in Figure 2. In the mechanical (vs. control) condition we found no indirect effect feelings of personal value on identification, indirect effect = 0.13, SE = 0.07, p = .109, 95%CI [-0.03;0.26]. However, in the organic (vs. control) condition, we found an indirect effect of personal value on identification showing a partial mediation, indirect effect = 0.17, SE = 0.06, p = .007, 95%CI [0.05;0.30]. The same mediation emerges for belonging, see Figure 3. In the mechanical (vs. control) condition, there was no significant indirect effect between D1 and belonging through personal value, indirect effect = 0.09, SE = 0.07, p = .170, 95%CI [-0.04;0.22]. In line with our hypothesis, in the organic solidarity (vs. control) condition, there was an indirect effect through personal value showing a full mediation, indirect effect = 0.13, *SE* = 0.06, p = .038, 95%CI [0.01;0.26][7].

Discussion

As predicted, both the organic and the mechanical condition, compared to the control condition, fostered identification and belonging to the group. Moreover, it did not matter whether one acted or merely observed: both actors and observers expressed higher levels of identification and belonging to the

7 When we do these mediation analyses for the actors only, we find the same; in the mechanical (vs. control) condition there was no indirect effect of personal value on belonging and identification, indirect effect belonging = 0.10, SE = 0.07, p = .157, 95%CI [-0.04;0.23] and indirect effect identification = 0.18, SE = 0.11, p = .098, 95%CI [-0.03;0.39]. However, in the organic (vs. control) condition there was an indirect effect of personal value on belonging and identification, indirect effect belonging = 0.19, SE = 0.08, p = .014, 95%CI [0.04;0.35] and indirect effect identification = 0.36, SE = 0.12, p = .002, 95%CI [0.14;0.59]. For the observers only, all the indirect effects were not significant, ps > .503, which is in line with our predictions, as we did not expect a difference between the conditions for personal value of the observers.

group as whole. This provides evidence for our main hypothesis that not only coordinating together, but also observing others coordinate can have a positive impact on the experience of groupiness. Furthermore, we found that actors in the organic and mechanical condition experience more personal value to the group than the control condition. This did not hold for the observers. This is not surprising, as the observers take no active part in the coordination, and thus felt less indispensable to the group. However, personal value was essential in determining feelings of identification and belonging in the organic condition. Personal value partially (for identification) and fully (for belonging) mediated the relationship between organic solidarity (vs. control) and the solidarity experienced. This confirms the different pathways to solidarity also found in previous research (Koudenburg et al., 2015; Van Mourik Broekman, Koudenburg, Gordijn, Krans, & Postmes, 2017).

Finally, the measures of (perceived) entitativity showed that the actors in the experimental conditions *experienced* unity and *were perceived as* a unit equally in the organic and mechanical condition. This confirmed our expectation that the organic and mechanical airband coordination tasks manipulated unity to the same extent.

Experiment 2

In Experiment 1 the experimental and control conditions were designed to compare two forms of co-action with a situation in which there is no co-action. As a result, the control condition had no role distinctions. Because we were also interested in testing a situation in which there is action in the control condition, but no option for coordination among the actors, we designed a second experiment in which we altered the control condition. Here, actors in the control condition performed individually while observers watched. This allowed us to test whether it is acting in itself that causes the experienced solidarity or whether it is acting *together* that makes the difference. Furthermore, we wanted to use this second experiment to explore whether the *behaviour* of the actors and passive observers was also affected. We therefore designed a follow-up task for which an entirely different kind of behaviour (unrelated to the airband performance) was required of the whole group (actors and observers). Specifically, we asked groups to warm-up for a subsequent (ostensible)

competitive task against other groups. Through observation measured levels of activity, structure, and sociality to explore whether differences between conditions would emerge.

Method

Participants

Two hundred seventy-six participants (193 female, 83 male, M_{age} = 20.31, SD_{age} = 2.26) participated for either course credits or a small monetary reward (€7)[8]. The majority of the participants were students (194 from the international psychology program, 49 from the Dutch psychology program, 28 from other study programs, and 5 indicated that they did not study). Participants participated in a group of four to eight participants and were randomly allocated to one of the three conditions: control, mechanical solidarity, or organic solidarity, and one of two roles, observer or actor (control: observers: n = 42 and actors: n = 44, mechanical solidarity: observers n = 47 and actors n = 51, and organic solidarity: observers n = 44 and actors n = 48). Again, the experiment was advertised and conducted in English.

Procedure

Groups of four to eight participants were welcomed into a large room and were randomly given a badge with a number from one to eight. Participants who received a badge with the numbers one to four were observers and participants who received a badge with the number five to eight were actors. After this, participants were led into a separate room with eight laptops to complete the pre-questionnaire[9]. First participants were asked to give demographic information such as age, gender, nationality, study, and English proficiency.

For the next part of the experiment, participants were guided into the large room again. Similar to Experiment 1, the experimenter asked participants to stand on the number corresponding to their badge. Then, participants received written

8 The sample size was not increased after analysis. Power for detecting a medium effect size was calculated post hoc as in Experiment 1 and was .82 (based on an average ICC of .11 and average cluster size of 7, Snijders, 2005).

9 Only the measures central to this paper are presented. Pre-measures such as need to belong, need to conform, and need for distinction, are omitted in this paper as they are not relevant to test our hypotheses. Data from these measures are available via the first author.

instructions for the 'musical task'. The set-up of the musical task was the same as in Experiment 1. However, different from Experiment 1, in the control condition, actors now also received the instructions to play "air instruments" while listening to a song. They were allowed to choose any instrument they like, even if it was not used in the song. However, actors were separated by dividers so that none of the actors could see one another, but the observers could still see all actors.

After the task, participants were asked to go to the laptop room again for the second part of the questionnaire. First, participants were asked to indicate on a 10-point scale how comfortable they felt, how much effort they exerted, how difficult they found the task, how much fun the task was, and how much they enjoyed the task.

To measure experienced solidarity, participants completed scales of identification, belonging, and entitativity (this time also in the control condition). Furthermore, personal value of participants was measured to test whether different identity formation processes take place in the mechanical and organic solidarity conditions. Identification with the group was measured with five items from the identification scale; 'I identify with the other participants in the group', 'I feel solidarity with the other participants in the group', 'I am glad to be a member of this group', 'I am similar to the average group member', and 'The other participants and I have a lot in common with each other' (Cronbach's α = .79; Leach et al., 2008; Postmes, Haslam, & Jans, 2013). Belonging (α = .73) and personal value (α = .76), entitativity (actors: α = .90, observers: α = .89) were measured similarly as in Experiment 1.

Some additional concepts were measured; engagement of the actors with the performance was measured with two items; 'My attention was fully captured by the performance' and 'I got carried away by the performance' (α = .76, r = .62). Engagement of the observers was measured with three items; 'I sometimes found myself to become so involved with the performance that I wanted to join', 'I felt the urge to join the performance while I was watching', and 'It was as if I was participating in my mind while I was watching' (α = .92). Finally, the level of arousal of all participants was measured with three items, 'The performance was exciting', 'The performance was boring' (reversed), and 'The performance was arousing' (α = .76). All items were measured on a 7-point Likert scale.

Next, participants were asked to write down which instrument they chose

to play in the 'musical task' to check whether participants had not chosen the same instrument in the organic condition and chose a guitar in the mechanical condition. Lastly, acquaintance was measured as in Experiment 1.

When participants had completed the second part of the questionnaire, they were led into the large room again for the final task. In the large room participants received written instructions that the groups were to compete in a dance game using dance mats. Before they would be led into the room with these devises, they were asked to warm-up for four minutes to prepare. In reality there was no dance game and we were interested in the group behaviour (i.e., the level of activity, structure, and sociality) during the warming-up session. The experimenter put on some music (the same for all groups) and left the room for four minutes. The warming-up was filmed to make later analyses possible.

Two coders rated the videos with the warm-up task on levels of activity, structure, and sociality in the group[10]. We measured activity because the task demanded activity, and levels of activity would be a proxy for the effort, and thus the commitment to the group (as the participants believed that they were about to compete as a group against other groups). Structure was measured because in previous research we have conducted on audiences that had been exposed to displays of mechanical and organic solidarity, we found behavioural effects on structure (Van Mourik Broekman et al., 2017). Finally, sociality was measured because it resembles our dependent variable solidarity (belonging and identification) as measured in the questionnaire. We wanted to be able to capture this social effect in behaviour as well. The coders were asked to first rate only the first minute of the video on several semantic differential items that intended to capture the levels of activity, structure, and sociality in the group. Subsequently, they were asked to do the same for the last three minutes. We wanted to separate the first minute from the rest of the video because we expected to find most effect in the first minute (because it was closer in time to the manipulation). Activity was measured with five semantic differentials, calm – energetic, passive – active, static – dynamic, aimless – motivated, and bored –

10 Several other semantic differential items were included for exploratory purposes; there is no leader – there is a leader, unoriginal – original, non-conforming – conforming, quiet – loud, and relaxed – tense. Theoretically we were mostly interested in structure, sociality, and activity. Therefore, we only report the aggregated scales of structure, sociality, and activity. Data from the remaining measures are available via the first author.

stimulated. The data from these items were aggregated for both the first minute (Cronbach's α coder 1 = .95 and Cronbach's α coder 2 = .89) and the last minutes (Cronbach's α coder 1 = .72 and Cronbach's α coder 2 = .97). The interrater reliability between both coders was high for both the first minute (ICC(2,2) = .73) and for the last minutes (ICC(2,2) = .73) and was therefore aggregated for each time point.

Structure was measure with seven items; disorganized – organized, spontaneous – mindful, uncooperative – cooperative, directed – impulsive (reversed), chaotic – structured, separated – united, and 'everybody seemed to be doing their own thing' – 'they seem to act according to a shared plan'. Again, data were aggregated for the first minute (Cronbach's α coder 1 = .93 and Cronbach's α coder 2 = .64) and the last minutes (Cronbach's α coder 1 = .96 and Cronbach's α coder 2 = .72). For each time point, data form the coders was aggregated, the interrater reliability between both coders was moderate for the first minute (ICC(2,2) = .51) and substantial for the last minutes (ICC(2,2) = .73).

Finally, sociality was measured with six items; unpleasant – pleasant, disconnected – connected, uncomfortable – comfortable, unfriendly – friendly, closed – open, and unsocial – social. For each coder, the data was again aggregated (first minute, Cronbach's α coder 1 = .56 and Cronbach's α coder 2 = .90, and last minutes, Cronbach's α coder 1 = .96 and Cronbach's α coder 2 = .95). The interrater reliability for each time point was moderate for the first minute (ICC(2,2) = .48), and good for the last minutes (ICC(2,2) = .81) and was aggregated for each time point.

Results

As in Experiment 1, data was analysed via multilevel modelling using two contrasts to compare the control condition with the experimental conditions (ψ1: control = -2/3, mechanical = 1/3, organic = 1/3) and to compare the two experimental conditions (ψ2: control = 0, mechanical = -1/2, organic = 1/2). The main effects of the contrasts and role (actor vs. observer) and the interaction terms were tested. All outcomes were controlled for main effects of how comfortable participants were, how much effort they exerted, how much fun they had, how much they enjoyed the task and how well they knew the other participants in the group. Because these are not the variables of interest,

these effects are not presented here. There were no main or interaction effects between contrasts and role for how difficult participants found the task and how shy they were; therefore, these variables were not included in the model[11].

Experienced solidarity

First, we analysed the data for the whole group. For identification and belonging (the measures of experienced solidarity) we wanted to establish whether the experimental conditions evoked more solidarity than the control condition and whether this effect was present among both the actors and the observers. Because we did not hypothesize interaction effects for role and contrast on solidarity, we first analysed the model fit with and without the interaction terms. When the interaction terms did not improve the model fit (cut-off value $p = .10$), the model without the interaction terms was analysed. Regardless of whether the interaction term was significant, simple main effects were analysed to compare the effects for actors and observers separately.

For identification, the model fit did not improve significantly when adding the interaction terms to the model, $\Delta AIC = 0.56$, *logLikelihood ratio* χ^2 (2) = 4.56, $p = .102$. Therefore, the model without the interaction terms was tested. In line with our expectations (H1a) this showed that participants in the mechanical and organic condition identified more with the group than participants in the control condition, $b = 0.29$, $SE = 0.14$, $t(36) = 2.12$, $p = .041$, 95% CI [0.02, 0.56]. We found no effects of role or the organic vs. mechanical contrast on identification both $|ts| < 0.94$, *ns* (H1b). To compare whether the effects were present for both actors and observers, simple main effects were tested (H2). For actors we find the same pattern of effects, actors in the mechanical and organic condition identify more with the group than participants in the control condition, $b = 0.51$, $SE = 0.19$, $t(36) = 2.65$, $p = .012$, 95% CI [0.13, 0.89]. Levels of identification did not differ between actors in the mechanical and actors in the organic condition, $t = 0.32$, *ns*. For the observers, however, we found no evidence for a difference between observers in the mechanical and organic condition and the observers in the control condition, nor between the observers in the mechanical and observers in the organic condition, $|ts| < 1.41$, *ns*.

11 Output from all analyses (with and without covariates) can be found in the supplementary material.

The model fit for belonging improved significantly after including the interaction terms, $\Delta AIC = 27.76$, *logLikelihood ratio* χ^2 (2) = 31.76, $p < .001$. We therefore analysed the model with the interaction terms and the simple main effect for actors and observers separately. We found a main effect for role; in contrast to Experiment 1, actors experienced less belonging than observers, $b = -0.39$, $SE = 0.12$, $t(226) = -3.32$, $p = .001$, 95% CI [-0.63, -0.16]. Both main effects of the contrasts and the interaction effect of the organic vs. mechanical contrast and role were non-significant, all $|t\text{'s}| < 1.58$, *ns*. However, we found an interaction effect between the experimental vs. control contrast and role, suggesting that the difference between the control condition and the mechanical and organic conditions was different for actors and observers, $b = 1.23$, $SE = 0.22$, $t(226) = 5.54$, $p < .001$, 95% CI [0.80, 1.67]. When examining the effect of the experimental vs. control contrast separately for actors and observers, we found that in line with the hypothesis (H1a), actors in the mechanical and organic condition felt more belonging with the whole group than actors in the control condition, $b = 1.36$, $SE = 0.24$, $t(36) = 5.60$, $p < .001$, 95% CI [0.88, 1.84]. However, unlike Experiment 1, for the observers this effect disappeared, $t(36) = 0.52$, *ns*. Interestingly, for the observers we find a marginally significant effect on the organic vs. mechanical contrast showing that observers in the organic condition felt slightly less belonging to the whole group than observers in the mechanical condition, $b = -0.33$, $SE = 0.18$, $t(36) = -1.88$, $p = .069$, 95% CI [-0.68, 0.02].

For personal value, we analysed the model without the interaction terms because the interaction terms did not contribute significantly to the model fit, $\Delta AIC = -0.01$, *logLikelihood ratio* χ^2 (2) = 3.99, $p = .136$. In line with our hypothesis (H3b), participants in the organic condition experienced more personal value to the group than participant in the mechanical condition, $b = 0.47$, $SE = 0.16$, $t(36) = 3.01$, $p = .005$, 95% CI [0.16, 0.77]. Furthermore, participants in the control condition experienced slightly more personal value to the group than participants in the experimental conditions, although this effect did not reach statistical significance, $b = -0.26$, $SE = 0.14$, $t(36) = -1.86$, $p = .071$, 95% CI [-0.53, 0.01]. Finally, actors experienced more personal value than observers, $b = 0.75$, $SE = 0.14$, $t(228) = 5.40$, $p < .001$, 95% CI [0.48, 1.03] (H3a). To compare actors and observers, we analysed these separately. For actors we found the results in the expected direction, actors in the organic condition felt more personally

valuable to the group than actors in the mechanical condition, $b = 0.67$, $SE = 0.23$, $t(36) = 2.88$, $p = .007$, 95% CI [0.22, 1.13]. Also, we found that actors in the control condition felt slightly more personally valuable to the group than the experimental conditions combined, although this was only marginally significant, $b = -0.39$, $SE = 0.21$, $t(36) = -1.86$, $p = .071$, 95% CI [-0.79, 0.02][12]. For the observers, both effects disappeared, $|t's| < 1.10$, *ns*.

Because of the high levels of personal value of the actors in the control condition (see Table 3), a mediation analysis as in Experiment 1 cannot yield the same results. However, the correlations between solidarity (aggregated items from identification and belonging, Cronbach's $\alpha = .85$) and personal value (Table 4) could give some insights in the processes that lead to the emergence of solidarity in the different conditions. These correlations display a similar pattern as in Experiment 1 (cf. Table 2 for correlations of Experiment 1). For actors, the correlations between solidarity and personal value in the control condition ($r = .07$, *ns*) and in the mechanical condition were non-significant ($r = .30$, $p = .036$) whereas in the organic condition this was significant ($r = .58$, $p < .001$). The correlation from the organic condition was significantly stronger than the mechanical condition, $z = 1.70$, $p = .044$, as well as the control condition, $z = 2.73$, $p = .003$ (Kou, 2002). This suggests that, for the actors, solidarity is related to personal value only in the organic condition, which is in line with the findings from Experiment 1. For the observers, there was no significant correlation between solidarity and personal value in the control condition ($r = .18$, *ns*) or in the mechanical condition ($r = .24$, *ns*), but there was for the organic condition ($r = .33$, $p = .027$). Comparison of the correlations between the organic condition and the mechanical condition revealed that they did not significantly differ from one another, $z = 0.46$, $p = .324$, nor did the correlations between the organic and the control condition, $z = 0.74$, $p = .229$.

Measures for actors only

Confirming H1a, we found that actors in both the mechanical and the organic condition experienced more entitativity with fellow actors than actors in the control condition, $b = 0.76$, $SE = 0.26$, $t(36) = 2.96$, $p = .006$, 95% CI [0.26, 1.27].

12 This unexpected effect became non-significant when outliers (standardized residuals below the 2.5th and above the 97.5th percentile) were removed.

Table 3. Means and standard deviations per condition for all dependent variables (Experiment 2).

	Condition											
	Control				Mechanical				Organic			
	Observer (*n* = 42)		Actor (*n* = 44)		Observer (*n* = 47)		Actor (*n* = 51)		Observer (*n* = 44)		Actor (*n* = 48)	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Belonging	4.95	(0.96)	3.67	(1.15)	5.38	(0.83)	4.96	(1.12)	5.04	(0.94)	5.23	(1.07)
Identification	4.04	(1.00)	3.80	(0.96)	4.35	(0.87)	4.15	(1.02)	4.04	(0.95)	4.40	(1.11)
Personal value	2.21	(0.85)	3.20	(1.03)	2.11	(1.03)	2.46	(1.08)	2.27	(0.96)	3.35	(1.48)
Solidarity (aggr.)	4.50	(0.80)	3.73	(0.91)	4.87	(0.74)	4.55	(0.93)	4.54	(0.82)	4.82	(0.93)
Arousal	3.93	(1.17)	4.39	(1.15)	4.11	(1.23)	4.33	(1.13)	4.63	(1.22)	4.55	(1.40)
Entitativity			3.42	(1.32)			4.11	(1.25)			4.27	(1.32)
Engagement actors			3.03	(1.30)			3.48	(1.34)			3.77	(1.55)
Perceived entitativity	3.16	(1.52)			3.97	(1.08)			4.27	(1.16)		
Engagement observer	3.54	(1.76)			4.45	(1.71)			4.44	(1.47)		

Table 5. Means and standard deviations per time point and condition for dependent variables from the warm-up (Experiment 2).

	Condition											
	Control				Mechanical				Organic			
	First minute		Last minutes		First minute		Last minutes		First minute		Last minutes	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Activity	3.87	(1.20)	2.82	(1.68)	3.97	(1.21)	3.05	(1.34)	4.24	(1.49)	4.48	(1.76)
Structure	4.68	(1.09)	4.16	(1.09)	4.41	(0.97)	4.35	(0.87)	4.60	(0.98)	4.55	(1.48)
Sociality	4.87	(0.91)	4.37	(1.63)	4.90	(0.90)	4.69	(1.14)	5.01	(1.03)	5.22	(1.17)

No difference was found between actors in the mechanical condition and actors in the organic condition, $t(36) = -0.17$, *ns* (H1b). Furthermore, there was no difference between the experimental condition and the control condition, nor between the two experimental conditions, for engagement with the performance, $|ts| < 1.64$, *ns*. We also measured identification of the actors with the actors and with the observers. Even though we found effects of overall identification with the whole group, we did not find effects of actors' identification.

Measures for observers only

In line with our hypothesis about experiencing solidarity (H1a), observers in the mechanical and organic condition also *perceived* more entitativity among the actors than the observers in the control condition, $b = 0.83$, $SE = 0.24$, $t(36) = 3.42$, $p = .002$, 95% CI [0.36, 1.31]. Moreover, observers in the mechanical and organic condition were more engaged in the performance than observers in the control condition, $b = 0.61$, $SE = 0.30$, $t(36) = 2.05$, $p = .048$, 95% CI [0.03, 1.19]. As expected, there were no differences in perception of entitativity among the actors between the observers in the mechanical and the organic condition, $t(36) = 1.10$, *ns*, nor in the level of engagement between the observers in the mechanical and organic condition, $t(36) = -0.16$, *ns*. As with the actors, we also measured identification of the observers with the observers and with the actors. Here also, we did not find effects of observers' identification.

Arousal

For arousal, the model fit improved marginally significantly when adding the interaction terms to the model, $\Delta AIC = 0.71$, *logLikelihood ratio* χ^2 $(2) = 4.71$, $p = .095$. We therefore analysed the model with the interactions. We found a main effect showing that participants in the organic condition were more aroused by the musical task than participants in the mechanical condition, $b = 0.49$, $SE = 0.23$, $t(36) = 2.09$, $p = .044$, 95% CI [0.03, 0.94]. We found no differences in arousal between the participants in the control condition and participants in the experimental conditions, nor did this interact with role, both $|ts| < 1.35$, *ns*. Overall actors were more aroused than observers, $b = 0.29$, $SE = 0.13$, $t(226) = 2.20$, $p = .029$, 95% CI [0.03, 0.54]. Furthermore, the difference between the

mechanical and organic condition was different for actors and observers, b = -0.54, SE = 0.27, $t(226)$ = -1.97, p = .050, 95% CI [-1.07, -0.004]. When we looked at the actors only, we found no difference between the actors in the mechanical and the actors in the organic condition, $t(36)$ = -0.32, *ns*. The observers in the organic condition, however, were slightly more aroused than the observers in the mechanical condition, although this was only marginally significant, b = 0.49, SE = 0.26, $t(36)$ = 1.87, p = .070, 95% CI [-0.02, 1.00].[13]

When we look at the correlations between solidarity and arousal per role and condition (see Table 4), we see that arousal is positively correlated with solidarity for observers in the organic condition (r = .67, p < .001). This correlation is significantly stronger than the correlation between arousal and solidarity in the mechanical condition (r = .19, *ns*), z = 2.84, p = .002, and marginally stronger than the correlation between arousal and solidarity in the control condition (r = .42, p = .006), z = 1.63, p = .051.

Post-performance interactions

The video data of the post-performance task were analysed at the group level using regression analysis with the experimental vs. control contrast and the organic vs. mechanical contrast. We found no effects in the first minutes for levels of activity, structure, or sociality, all $|t|$s < .53, *ns*. However, for the last minutes we found an effect for activity: groups in the organic condition were more active in the last minutes of the warm-up task than groups in the mechanical condition, b = 1.44, SE = 0.64, $t(34)$ = 2.25, p = .031, 95% CI [0.14, 2.74]. There was no difference in levels of activity between the control condition and the two experimental conditions, $t(34)$ = 1.69, *ns*. Furthermore, we found no effect on level of structure and sociality in the last minutes of the warm-up task, all $|ts|$ < 1.27, *ns*.

A repeated measures analysis of activity over time (the first minute vs. the last minutes), reveals that both time, $F(1,34)$ = 12.96, p = .001, and the interaction

13 We also measured empathy with the performance, positive evaluation of the performance, and how well the participants thought they would collaborate with the group in the future. For neither variables, we found any main or interaction effects. For negative evaluation we found that participants in the organic and mechanical condition found the performance slightly less negative than participants in the control condition, although this effect was only marginally significant, b = -0.51, SE = 0.26, $t(36)$ = -2.01, p = .052, 95% CI [-1.02, -0.01].

between time and condition are significant, $F(2,34) = 6.47$, $p = .004$. Figure 4 shows that both in the mechanical and the control condition activity seems to decline over time, however, in the organic condition, groups seem to stay active throughout the task[14].

Table 4. Correlations between solidarity (aggregated items of belonging and identification), personal value, and arousal per condition (Experiment 2)

Condition	Role		1.	2.
Control	Observer	1. solidarity	—	
		2. personal value	.178	—
		3. arousal	.420**	.259
	Actor	1. solidarity	—	
		2. personal value	.072	—
		3. arousal	.161	.225
Mechanical	Observer	1. solidarity	—	
		2. personal value	.242	—
		3. arousal	.193	.017
	Actor	1. solidarity	—	
		2. personal value	.297*	—
		3. arousal	.290*	.309*
Organic	Observer	1. solidarity	—	
		2. personal value	.333*	—
		3. arousal	.671***	.229
	Actor	1. solidarity	—	
		2. personal value	.579***	—
		3. arousal	.584***	.410**

Note: *p<.05; **p<.01; ***p<.001

14 To test whether the activity on the organic condition at time 2 could be explained by the increased arousal in this condition, an exploratory mediation analysis was performed, see supplementary material. Indeed, for activity at time 2, we found a marginally significant indirect effect of the organic condition compared to the control condition on activity at time 2 via arousal at group level, indirect effect = 0.40, SE = 0.24, $p = .089$, 95%CI [-0.06;0.86]. We found no such indirect effect for arousal on activity on time 1.

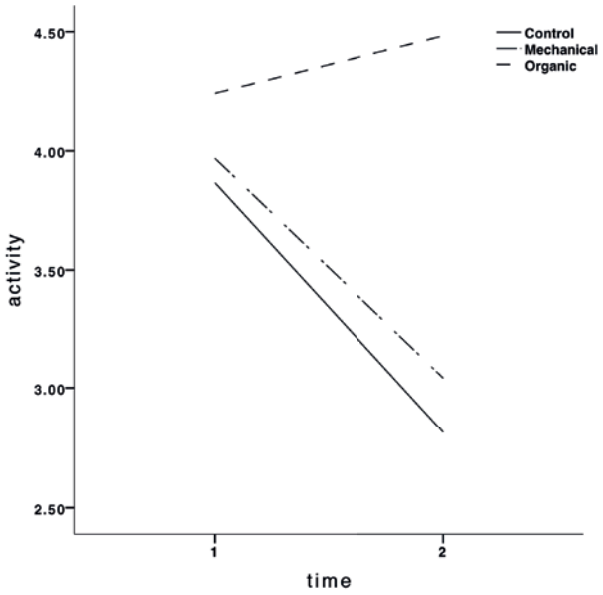

Figure 4. Experiment 2: Levels of activity in the group per condition for the first minute (time point 1) and the last minutes (time point 2)

Discussion

Experiment 2 replicated the solidarity effects found in Experiment 1 for the actors; actors in the mechanical and organic condition identified more and felt more belonging to the group than actors in the control condition. However, contrary to our hypotheses these effects were not found for observers. We think this is a result of the altered control condition. While in Experiment 1 'actors' in the control condition were not active, in the current experiment, observers in the control condition were able to observe all actors perform. This may have elevated their sense of identification and belonging to the group (see Table 3) whereas actors in the control condition were unable to see or coordinate with fellow actors, and thus could not share this sense of solidarity. We speculate that the actors in the control condition were put into a, perhaps embarrassing, position in which they had to perform without receiving visual feedback from their co-performers. As the observers were aware of this, and perhaps perceived some discomfort, they may have sympathized with the actors to the same

extent as the observers in the experimental condition (but for a different reason). Furthermore, as the actors in this condition were performing to that same song, and thus the same rhythm, they may have, inadvertently, looked coordinated. And although the observers perceived less unity among the actors, as they knew the actors were not actually coordinating, visually it may not have looked uncoordinated, making solidarity with the individual actors possible.

We also see that the new control condition affects the sense of personal value of the actors. Like Experiment 1, for observers, there were no differences in personal value between the different conditions. This is not an unexpected finding as observers in all three conditions contribute equally to the group (they do not participate in either condition). Actors in the organic condition, as in Experiment 1, felt more personally valuable to the group than actors in the mechanical condition. However, because the actors in the control condition actually individually contribute to the total performance, we found that they experience personal value to the group to a larger extent than the actors in the experimental conditions combined (although they do not feel more personally valuable than actors in the organic condition, see Table 3 for descriptive statistics). This is in line with our previous research that shows that actors who have to perform solo (i.e., as individuals) can experience heightened levels of personal value to the same extent as actors who are performing in a complementary fashion (Koudenburg et al., 2015, Experiment 3). Because of the changed outcomes as a result of the control condition, performing a mediation analysis as in Experiment 1 could not reveal the same effects. Importantly however, correlations between personal value and solidarity (identification and belonging combined) suggest a similar pattern; in the organic condition, for the actors, feeling personally valuable in the group is strongly correlated with the sense of solidarity in the group, but not in the control or mechanical conditions.

Actors in the mechanical and organic solidarity condition also experience the group of performers as more united than the actors in the control condition. The same was true for observers: in the mechanical and organic condition observers perceived the actors to be more united than in the control condition. We also found that observers in the mechanical and organic solidarity conditions were more engaged in the performance than observers in the control condition. This suggests that despite the fact that the control condition evoked solidarity in the

observers, they were less engaged in a performance of soloists. Furthermore, when we look at evoked arousal, we found that participants in the organic condition felt more aroused than participants in the mechanical condition and that this effect is driven by the observers in the organic condition. This suggests that the heightened engagement from observers in both the mechanical and organic condition led to increased arousal only for the observers in the organic condition. The organic performance was thus able to rouse the observers more than the mechanical performance was, and this was positively associated with the solidarity they experienced with the group as a whole. This may in turn explain the behavioural effects we found in the warm-up task; groups in the organic condition remained active throughout the task whereas groups in the mechanical and control condition decreased their activity over time.

General Discussion

From the interactive model of identity formation, specific predictions can be derived about the way in which coordinated interactions between people can foster group formation (e.g., Koudenburg et al., 2015). The current research demonstrates that this group formation is not restricted to those who coordinate their action, but can extend to observers who do not participate actively. We show that two distinct forms of coordination, mechanical or organic displays, can both foster the emergence of an overarching group that includes both performers *and* observers. Interestingly, this even happens when actors and observers are not previously acquainted. This research provides an insight into why performing arts bring performers and spectators together. More broadly, this research illustrates that small numbers of individuals that act as a group, can influence and shape a broader social environment by psychologically blurring the boundary between the active group and its observers: well-coordinated actions on stage can foster an emergent sense of "us" that includes the audience as well.

This research shows that acting together mechanically or organically can evoke a sense of solidarity with the whole group (identification and belonging, both studies; H1a) and with the actors (entitativity, Experiment 2). Experiment 1 showed that observers who watch mechanical and organic displays of co-action experience solidarity with the whole group of actors and observers (although

to a lesser extent than the actors) compared to a no performance control condition. Experiment 2 did not replicate this effect, likely because we changed the control condition to a condition in which there was a performance, but not coordination (actors performed solo). As a result, observers in the control condition experienced equal levels of solidarity with the group as observers who saw displays of mechanical and organic solidarity. We believe this is because observers in the control condition in Experiment 2 were able to see all performers act and were perhaps sympathizing with their situation (actors were randomly assigned to act in solo, which could, thus, also have happened to the observers). However, in support of our original hypothesis (H1a), we found that observers in this control condition perceived less entitativity among the actors and were slightly less engaged in the performance than observers who watched displays of co-action (mechanical or organic).

When we look at the distinction between the two forms of co-action, in both studies we confirmed our hypothesis that organically coordinated action instilled among actors a greater sense of personal value to the group than mechanical co-action (H3a). Even though individual actors were not actually contributing musically to the performance (after all, they were just playing imaginary instruments), they were experiencing a sense of personal value to the group. Overall, observers felt less personally valuable to the group than actors (H3b), and this did not differ across conditions. More importantly, in Experiment 1, feelings of solidarity were mediated by feeling personally valuable to the group in the organic (vs. control) condition but not the mechanical (vs. control) condition (H4). Like previous research (Koudenburg et al., 2015) this suggests that mechanical and organic solidarity are two distinct forms of solidarity that are formed through different pathways. Correlations between personal value and solidarity (identification and belonging) in Experiment 2 show a similar pattern; in the organic condition, but less so in the mechanical condition, personal value is strongly correlated with solidarity.

Experiment 2 uncovered another distinction between displays of mechanical and organic co-action; despite being equally engaged in the performance, observers who watched organic co-action felt slightly more aroused after the performance than observers who watched mechanical co-action. Interestingly, this seems to translate into behaviour; groups in the organic condition remained

active throughout the warm-up task whereas the groups in the mechanical and control conditions had a declining activity throughout the task. Although these results have to be interpreted with caution, as only 37 groups were analysed, this does seem to suggest that there was a sustained commitment to the organic group. As the task was to warm-up for a subsequent task in which they had to compete with other groups, the heightened activity suggests that the groups in the organic condition were more willing to exert continued effort to maintain a high level of group performance.

Overall, these results show convincingly that observers can experience solidarity in line with a group of actors. Furthermore, this research reveals that there are different pathways to experiencing solidarity. When enacting organic forms of solidarity, a sense of personal value is an essential predictor in determining solidarity. Moreover, the second experiment shows that organic forms of solidarity (compared to mechanical forms of solidarity) can lead to heightened arousal. This in turn may predict behaviour; groups in the organic condition remained more active during the post-experiment warm-up task[15]. This suggest that acting, but also observing, solidarity can not only shape relationships but also behaviour.

Implications

This research shows that displays of solidarity in co-action, like a musical performance such as a concert, can evoke a sense of solidarity. In fact, this effect is not limited to those who "perform" and put their solidarity on display, but extends to those who observe. When actors and observers come together in such a way, actors can come to include observers in their psychological in-group, creating an overarching feeling of "we-ness'. Previous research focused on the effects of co-action on those who act (Fischer et al., 2013b; Koudenburg et al., 2015; Reddish et al., 2014, 2013, 2016; Valdesolo & Desteno, 2011; Wiltermuth & Heath, 2009), but the current research explains why observers can become an integral part of the social structure that emerges during a performance. Because observers recognize the social structure among the actors and feel solidarity with them, they can psychologically transcend the physical boundary

15 Exploratory mediation analysis revealed a marginally significant indirect effect from organic (vs. mechanical) solidarity to activity time 2 via arousal, see the supplementary material for the full analysis.

between actors and observers. But not all performances engender solidarity, and not all performances do so in the same way. The interactive model of social identity formation (Postmes, Haslam, et al., 2005) can help explain, in part, the process by which displays of solidarity can foster the emergence of solidarity. Specifically, results confirmed that solidarity can arise through different pathways, as predicted by this model. Feeling personally valuable plays a key role in emergent solidarity in an organic display: this points to the role of inductive (bottom-up) processes. In mechanical displays of solidarity, by contrast, similarity and perceived unity play a central role in emergent solidarity: this points to the role of deductive (top-down) processes.

Interestingly, our research shows that watching organic solidarity is more arousing to observers than watching mechanical solidarity. From the literature, one may expect that displays of mechanical solidarity (e.g., marching, chanting, applauding in unison, or performances, rituals, or sports in which people do the same thing) would be more arousing for both participants and audience. However, our research suggests that observing more complex and dynamic forms of interactions in which actions are complementary, can elicit arousal among observers more than mechanical performances. Strikingly, this seems to affect group behaviour.

The findings in this research can help us better understand the social-psychological impact of collective gatherings such as festivals, demonstrations, sports events, or other performances. The actions of a core group of people can shape and change the feelings and behaviour of a lager body of people. Interestingly, this research shows that not only professional performers who have performed together many times can elicit such social change, but that any aggregate of people that engages in coordinated action can. One can imagine that professional performers, who are trained in having an impact on the audience, could be even more influential in transforming an audience of strangers into a psychological group.

The current research has focused on the impact of on-stage performances, in which the actors are aware that they are performing for an audience. One may wonder whether similar processes of group formation take place when an audience unwittingly observes the actions of a group that is not explicitly performing for them (e.g., a group of schoolchildren playing a game on the

street, or a particular social interaction in a shop). It is likely that the mechanisms which play a role in the current research are not unique to performance settings: people should be able to feel a connection with the actions of any group they encounter. This research shows that the effects of within group processes are not limited to the individuals within the group, but can extend to the individuals around them.

These insights bridge the gap between the literature on solidarity emerging through organic and interactive processes within small groups on the one hand (e.g., Koudenburg, Postmes, et al., 2017b; Postmes, Haslam, et al., 2005; Postmes, Spears, et al., 2005) and the more mechanical processes of identification within large crowds on the other hand (e.g., Neville & Reicher, 2013; Novelli et al., 2013; Páez et al., 2015). Our findings demonstrate that the influence of organic forms of solidarity can reach beyond the boundaries of a small group of actors, if they are observed by a large audience. If we apply our findings more generally to other types of groups that are not necessarily performing, this can explain how people choose to support or join groups in their environment, or feel connected to groups they watch on television. As such, this research sheds light on a broad range of group growth phenomena.

Limitations and future research

In Experiment 1, all participants in the control condition received the same instructions; they had to imagine playing an instrument while listening to the song. As a result, there was no clear role distinction between these participants (apart from participants' position in the room). Although this design is somewhat inelegant, this allowed us to compare the experimental conditions to a true *baseline* condition in which there was a complete absence of action. To improve the experimental design, in the second experiment we created a control condition in which there was a distinction between roles. Here we had actors *act* but *not co-act* by letting them perform at the same time but independently of one another (using room dividers). This allowed for a comparison of the experimental condition with a control condition in which there was an absence of coordination, but no absence of action. However, this resulted in a design in which the comparison between conditions for actors was optimal, but for observers the comparison was not optimal as all observers watched some form

of coordinated performance. Observers were thereby able to feel a sense of solidarity with individual performers in the two solidarity conditions, but also in the control condition. Because of the altered control condition, some of the effects from the first experiment could not be replicated, i.e., the solidarity effects or observers, and the mediation effect of personal value on solidarity. Despite this, all other effects were replicated.

To establish the difference between mechanical and organic forms of coaction, we measured personal value. However, personal value is something that is experienced by those who act organically, and not those who remain passive and merely observe. Therefore, personal value cannot explain the solidarity experienced by observers of organic coaction. In previous research, in which we investigated audience responses to dance performances we found that, *perceptions* of personal value and unity among member of the dance group determined the solidarity experienced by audiences that watched organic solidarity (compared to individually performing dancers), whereas for the audiences that watched mechanical solidarity (compared to individually performing dancers) the solidarity experienced was only explained by perceptions of unity among the dance group (Van Mourik Broekman et al., 2017). In the current research, we were not able to explain the process of feeling solidarity for the observers. Future research should focus on determining what, besides perception of personal value among performers, can explain solidarity experienced by observers of organic solidarity. Perhaps the feeling that there is room for the individual in such groups, makes one feel like they belong to such a group.

Finally, performances, or any other coaction, cannot always be straightforwardly categorized into the two forms of solidarity discussed in this paper. It is important to note that mechanical and organic solidarity are not mutually exclusive and often both forms can be displayed in interactions. In our research, both experimental conditions had mechanical and organic elements. For instance, mechanical and organic solidarity were both manipulated by instructing the actors to execute a task. These top-down instructions required participants to conform to the experimenter's request. However, when comparing the two conditions to each other, the mechanical condition was clearly more mechanical due to the fact that actors all played "air-guitar" and

were therefore more similar. We managed to activate a sense of organic solidarity by letting the participants in this condition choose their *own* instruments for the performance freely. This was experienced, both by actors and observer, qualitatively differently than mechanical solidarity, as evidenced by the increased sense of personal value among actors, the increased experience of arousal among observers, and the heightened activity of the group as a whole in the organic solidarity condition (compared to the mechanical condition).

Conclusion

Performances can be entertaining and beautiful; we go to performances to experience great music, great performers, or a great show. But performances also have a social component. In fact, this research shows the social component of a performance can transcend the boundary between performers and audience and can shape the sense of togetherness they experience. This illustrates that the separation between performances and audience is physical, but not necessarily psychological. A performance can transform performers and a room full of separated individuals into a meaningful social entity. Acting together on stage can thus alter who we are and how we behave, even when only watching this. In this way, performances (even by non-professionals) have the power to spread solidarity among a previously unconnected group of individuals. In the end, such processes may bring about social change and even reshape society.

CHAPTER 4

Observing Synchrony in an Intergroup Context: Consequences for Social Perception and Relations

This chapter is based on Van Mourik Broekman, A., Koudenburg, N., Gordijn, E.H., & Postmes, T. (2017). Observing Synchrony in an Intergroup Context: Consequences for Social Perception and Relations. *Manuscript submitted for publication.*
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Abstract

In this paper, we investigate how people respond to synchrony from an in- or outgroup. We focus on social perceptions of and relations to a target group. In three studies, participants were shown a video of an amateur football in- or outgroup warming up in synchrony or not. We find that synchrony informs social perception: participants perceive more entitativity and competence when the target group moves synchronously (vs. asynchronously). However, the target group's identity informs the relationship experienced with the group: participants support and identify more with an in- than an outgroup. Furthermore, participants experience that the ingroup is most threatened when the outgroup team moves synchronously or the ingroup team moves asynchronously. This research shows that movements from a group can strongly influence perception, but not how one relates to it. Sharing a social identity is the central factor in determining whether one supports and identifies with a group.

Introduction

Moving together in synchrony has many social benefits. Research reveals that behaving in synchrony increases affiliation, belonging, prosocial behaviour, and cooperation (e.g., Hove & Risen, 2009; Koudenburg et al., 2015; Mogan, Fischer, & Bulbulia, 2017; Valdesolo & Desteno, 2011). Synchrony does not only affect those involved in the interaction, it also affects social perception of those who observe. Observers ascribe more entitativity (i.e., social unity) and rapport to individuals moving in synchrony (Lakens, 2010; Lakens & Stel, 2011; Miles, Lumsden, Richardson, & Macrae, 2011). Looking at the within group functions of such displays in, for instance, performing arts, sports, the army and in cultural rituals, acts of synchrony may benefit a community because they increase perceptions and experiences of social unity. But such displays also have impact on outgroups. Anecdotally, the marching in synchrony of soldiers and the Haka of New Zealand's rugby team are expressions of unity and strength. At least in part this seems designed to impress and intimidate an opponent; these displays could therefore threaten outgroup members. Thus, the impact of synchronous movement on ingroup and outgroup audiences may be very different.

r4This paper seeks to disentangle the impact of displays of synchrony on ingroup and outgroup audiences. As far as we know, prior research has examined the effects of observing (interpersonal) synchrony on observers, without any intergroup context being salient. Therefore, the central question is: do observers respond differently to displays of synchrony from an ingroup than from and outgroup within an intergroup context? In particular, we are interested in two elements: social perception of the target group and the relationship between observer and target group.

Synchrony

Synchronization of behaviour can take many forms. During interactions, people can copy the interaction partner's gestures, facial expression, speech, posture, etc. (Bernieri & Rosenthal, 1991; Burgoon et al., 1995; Chartrand & Bargh, 1999; Chartrand & Lakin, 2013). But people also perform more explicit forms of synchrony through, for instance, performing arts and sports. This seems to be an adaptive mechanism that promotes the formation and maintenance of the relationship. Research shows that people feel more affiliation and rapport,

behave more pro-socially, and cooperate more after having acted in synchrony with another person (Fischer, Callander, Reddish, & Bulbulia, 2013a; Mogan et al., 2017; Reddish et al., 2013; Wiltermuth & Heath, 2009).

Synchronized behaviour also signals cohesion to observers who are not part of the interaction. Although the literature on observing synchrony is not as extensive as the literature on performing synchrony, it seems that some of the social effects extend to observers as well. Research shows that observers ascribe unity and rapport to actors displaying synchrony (Bernieri et al., 1994; Ip et al., 2006; Lakens, 2010; Lakens & Stel, 2011; Miles et al., 2009b). In our own research, we show that coordinated behaviour in performing arts can affect audiences in such a way that the audience experiences solidarity in line with the actors (Van Mourik Broekman et al., 2017). This suggests that the effects of synchrony extend beyond the people performing the synchronized behaviour. Observing synchrony not only affects observers' social interpretation, i.e., their social perceptions of the target group as entitative, but also the feelings this arouses towards the target group, i.e., the experienced relationship with the target group. Based on previous findings, we would predict that observing a target group moving in synchrony leads observers to perceive that target group as more entitative *and* to experience a stronger sense of affiliation with them (e.g., to feel more identification and belonging). However, although this prediction makes sense for ingroups, perhaps it is less likely for outgroups.

The Role of (Inter-)Group Context

Intuitively, people's responses to a target group could depend on whether they share a social identity with it. Seeing an army march in synchrony may come across as frightening and alienating if they are the enemy. As there is little research on how shared social identity and an intergroup context may moderate the impact of synchrony, it is useful to examine synchrony effects within groups (intra-group effects) and between groups (inter-group effects) in more depth.

Much synchrony research does not specify any social context at all. People move in synchrony with others or observe a target group moving in synchrony without any prior specification as to the membership of these other people. However, because of the broader context within which such tasks take place

(e.g., people all participating in a psychological experiment) it is plausible that most prior research is more relevant to intra-group synchrony. Moreover, it has been suggested that inter-group dynamics kick in only when others are explicitly categorised as outgroup (Postmes, Haslam, et al., 2005).

Effects of synchrony on social perceptions of in- and outgroup

One of the main outcomes of moving in synchrony is the perception that a group has unity, which is often referred to as *entitativity* in the group literature (Lickel et al., 2000). Based on prior research, we know that people who move in synchrony are seen as more entitative (Lakens, 2010; Lakens & Stel, 2011; Miles et al., 2009b). Furthermore, performing synchrony requires some coordination skills. This could be, to the observers, an indicator of competence. Research indeed shows that synchrony, and coordinated co-action more generally, lead to enhanced team performance (Duarte et al., 2012; Valdesolo et al., 2010). Additionally, the perception of entitativity is positively related to perceptions of competence (Dang, Liu, Ren, & Gu, 2017). Synchrony may thus signal competence.

We infer from this literature that synchrony from an ingroup would signal entitativity and competence, whereas asynchrony, i.e., the lack of coordination, would signals less entitativity and competence. This becomes particularly relevant in a situation where there is intergroup competition and where synchrony and the associated competence may become relevant to anticipated ingroup performance. A lack of synchrony might lead to an anticipation of incompetence and thus to elevated levels of threat or fear of "losing".

With respect to the outgroup it is less clear how synchrony might affect social perceptions. To our knowledge no research has yet examined such effects and it is therefore more speculative what the influence of synchrony on social perceptions is. The large literature on outgroup homogeneity effects (Park & Rothbart, 1982) and ingroup homogeneity effects (Haslam, Oakes, Turner, & McGarty, 1995) may provide some insight: This literature, when taken together, suggests that while there is a tendency to perceive outgroups as more homogeneous, observers may also perceive ingroups as more homogeneous, particularly when an intergroup context is made salient. The inference from this literature would be that observing an outgroup move in synchrony would lead

to increased perceptions of entitativity. Similarly, this synchronous movement of the outgroup should also be taken as a sign of competence. However, ingroup observers might be somewhat reluctant to ascribe competence to the outgroup (i.e., outgroup derogation). It may thus be the case that the effect of synchrony on perceived competence might be somewhat smaller when watching an outgroup, and more pronounced when watching an ingroup.

Effects of synchrony on relations to in- and outgroup

Although a lot of research has examined the impact of synchrony on social perceptions, the relational underpinnings have less often been the subject of research. We have conducted (unpublished) prior research showing that closely coordinated movement by a target group of dancers (compared with an uncoordinated "control" performance of independently moving dancers) elicits feelings of belonging and identification with the dancers among audiences (Van Mourik Broekman et al., 2017). Although coordinated action is not exactly the same as synchrony, this leads us to expect that the base effect is that a synchronously moving target group might elicit feelings of belonging or identification of some sort. There are several reasons why this might work for a target ingroup who moves synchronously: after all, coordination enhances team performance (Duarte et al., 2012; Valdesolo et al., 2010) and it is known that successful ingroups elicit identification and belonging (basking in reflected glory), whereas people can dissociate from ingroups that are presented as unsuccessful (cutting-off reflected failure; Bizman & Yinon, 2002; Cialdini et al., 1976; Snyder, Lassegard, & Ford, 1986). Furthermore, it seems that when an intergroup context is salient, upward ingroup comparison can lead to more affiliation with the group (Schmitt, Branscombe, Silvia, Garcia, & Spears, 2006; Schmitt, Silvia, & Branscombe, 2000). This leads us to believe that ingroup synchrony would lead to more affiliation with a target group than ingroup asynchrony.

Conversely, for outgroups who act in synchrony we speculate that, especially in situations where there is inter-group competition, their actions do not just display competence but also convey threat. Hence, the relational consequences should be the opposite: one should feel more aversion towards a synchronously moving target outgroup. Also, it is unlikely that observers would affiliate with

an asynchronously moving outgroup. Thus, one would expect that observers psychologically distance themselves from a target outgroup irrespective of how they move.

Hypotheses

Given the literature, we formulated hypotheses for several measures of social perception and relationship with the target group. We measured social perception with perceived entitativity, competence, and threat from the target group (the latter only in Experiment 3). For relationship with the target group we measured support, belonging, and identification (Experiment 3). For some of our outcome measures our predictions are somewhat uncertain. We therefore formulated alternative hypotheses (H_a) as well. For perceived entitativity, competence, and threat from the target group, we predict a main effect of synchrony, irrespective of whether the target group is in- or outgroup; people perceive more entitativity, ascribe more competence and perceive the target group as more threatening, when the target group move synchronously versus asynchronously (H1). However, this effect may be slightly more pronounced when watching the ingroup, especially for competence ($H1_a$). In contrast, for support, belonging, and identification, we predict a main effect of the target group's identity irrespective of synchrony; observers would support and feel belonging with their ingroup more than with the outgroup (H2). Alternatively, one could expect that for the ingroup there would also be an effect of synchrony; observers might feel more support for and belonging with an ingroup moving in synchrony than an ingroup moving in asynchrony ($H2_a$). For observing the outgroup, support and belonging should be low irrespective of synchrony.

Overview of the Studies

In the current research, we investigate the effect of observing synchrony from a target in- or outgroup on social judgement when an intergroup context is made salient. We study this in a context in which a) coordination of action is relevant, b) intergroup competition is strong, and c) spectators are often present. We chose team sports, and in particular football (soccer), because all these elements come together in sports (Duarte et al., 2012; Rees et al., 2015).

In football, spectators often highly identify with "their" team, and rivalry exists between fans of different teams. Because synchrony is not necessarily observed in a game, we showed a warming up of the football team instead, the idea being that general coordination of action between members of a team during a warming up can be seen as an indication of success.

In three studies, we examined the influence of observing synchrony or asynchrony of an ingroup football team or an outgroup football team on social perception and the relationship experienced with the target group. The first experiment was exploratory with the aim to investigate the manipulation of the target group's identity and the intergroup context. Firstly, we wanted to know whether participants are susceptible to the manipulation of the target group's identity (textually), when we at the same time manipulate synchrony (visually). Secondly, we wanted to examine whether the group membership of interest, students from a certain nationality, was relevant in the context of an ostensible football competition.

Explorative Experiment 1

In this first experiment, we had Dutch students watch a student football team either warm up in synchrony or out of synchrony. The target group was either presented as an ingroup (Dutch students) or an outgroup (German students). We assessed levels of perceived entitativity, competence, support for the target team, belonging with the target team, and pre-identification with the overarching category Dutch students[1].

1 In both Experiment 1 and 2 we included measures of mood (pre- and post-measures) as well as post-identification with the overarching category (Dutch students in Experiment 1 and Germans in Experiment 2). For mood, we found no effect and therefore we do not present the data in this paper. For post-identification, we found marginally significant main effects for synchrony in opposite directions in the two studies. Because these results are inconclusive, and most likely mean that there is no effect of observing a football team on the overarching identity, we do not present the results here. Data are available with the first author.

Method

Participants

Data was collected from 80 participants (59 female, 21 male, M_{age} = 21.64, SD = 4.24)[2]. The participants were all Dutch students. The experiment had a 2 (synchrony: synchronous vs. asynchronous) x 2 (target group: ingroup vs. outgroup) between-subject design. Twenty participants were randomly assigned to one of the four conditions.

Procedure and materials

Participants were welcomed to the lab and were seated in a closed cubicle behind a computer. First, seven items pre-measured *identification with Dutch students* on a 7-point Likert scale (Cronbach's α = .74, Leach et al., 2008). Next, participants were presented a short text about an amateur international football competition. Participants read that they would get to see a video of one of the competing teams. Depending on condition, the team was presented to be either Dutch (ingroup) or German (outgroup). The videos showed ten male athletes doing several warming-up exercises (e.g., jumping jacks, squads, stretching). In one video the athletes performed all the exercises in synchrony and in the other video they performed the exercises out of synchrony. The videos were edited so that both were approximately 30 seconds long and both had the same music accompanying it (K'naan - Wavin'Flag).

After watching the video, we measured participant's *perception of entitativity* among the target group with two items (α = .76, Lakens, 2010); 'I feel that there is a sense of togetherness among the people in the video' and 'I feel the people in the video can act in unison'. We used single item measures for *competence*, 'I think the team I just watched has a good chance of winning the competition' and *support*, 'I would support the team that I just watched during the competition'. Next, four items measured feelings of belongingness with the target group; e.g. 'I felt connected with the people in the video' (α = .69, Need

2 The study was conducted by students as part of a course. The a priori power calculation revealed that with N = 128 one would be able to detect medium-sized effects (f = 0.25) with a power of .8. Unfortunately, due to time constraints the sample size was only N = 80, which resulted in a post-hoc power of .6.

Threat Scale, Van Beest & Williams, 2006)[3]. All items were measured on a 7-point Likert scale ranging from complete disagree to completely agree.

Finally, we added some manipulation checks and control questions. First, participants indicated, with an open question, the nationality of the athletes in the video. Secondly, they indicated whether the football team in the video moved, (a) 'in synchrony (everyone did more or less the same at the same time)', (b) 'not in synchrony (everyone moved in a different tempo)', or (c) 'I do not know'. Participants indicated nationality, gender, age, and study, were given an opportunity for remarks and were debriefed.

Exclusion criteria

We excluded two participants who answered the question about the target group's nationality incorrectly (one in each synchrony condition). This suggest that the in- and outgroup manipulation worked as hoped. Furthermore, one participant in the asynchrony outgroup condition indicated that the target group moved in synchrony. Because this suggests a lack of attention from the participant, this participant was excluded. Moreover, 17 participants from the synchrony conditions (outgroup condition $n = 9$, ingroup condition $n = 8$) indicated that the target group moved out of sync. We believe this was indicated by the participants because the athletes in the video did not 'perfectly' synchronize, therefore it may not have been perceived as synchrony. Because we expect that this does not reflect a lack of attention from the participants, but a stringent judgement of what synchrony is, we did not exclude these participants from the analysis. Finally, two of the participants (synchrony ingroup, $n = 1$ and synchrony outgroup, $n = 1$) did not have the Dutch nationality (they

3 Following this, participants did the cooperation task from Wiltermuth & Heath (2009), ostensibly with two other Dutch students in the lab. However, with some control measures, we tested whether participants had understood the task. Data revealed that a total of 23 participants indicated that they did not understand the task and/or could not correctly indicate the outcome of an example scenario. The power to detect effects after removing these 23 participants is too low. Therefore, we have decided that presenting the result here would be meaningless, as no solid conclusions can be drawn from this data. The following trust measure (adapted from Reddish et al., 2013; Wiltermuth & Heath, 2009) is not presented here either, because responses to this measure may have been affected by the lack of understanding of the cooperation task. Finally, in a control question we asked what the nationality of the co-participants in the lab were and we measured how well participants knew the co-participants in the lab to be able to statistically control for this in the analysis. We do not report outcomes of these as it is irrelevant to the other outcomes.

were German and German/South African), and were therefore excluded from the analysis. Data from 75 participants remained for analysis.

Results

We analysed the data with 2 (synchrony vs. asynchrony) x 2 (ingroup vs. outgroup) ANOVA (data from Experiment 1 can be found in Table 1 and Figure 1). We included pre-identification with Dutch students as a moderator. Initially all two-way and the three-way interactions were added to the analysis. However, none of the interactions with pre-identification were significant, therefore only the main effect of pre-identification was included in the analysis.

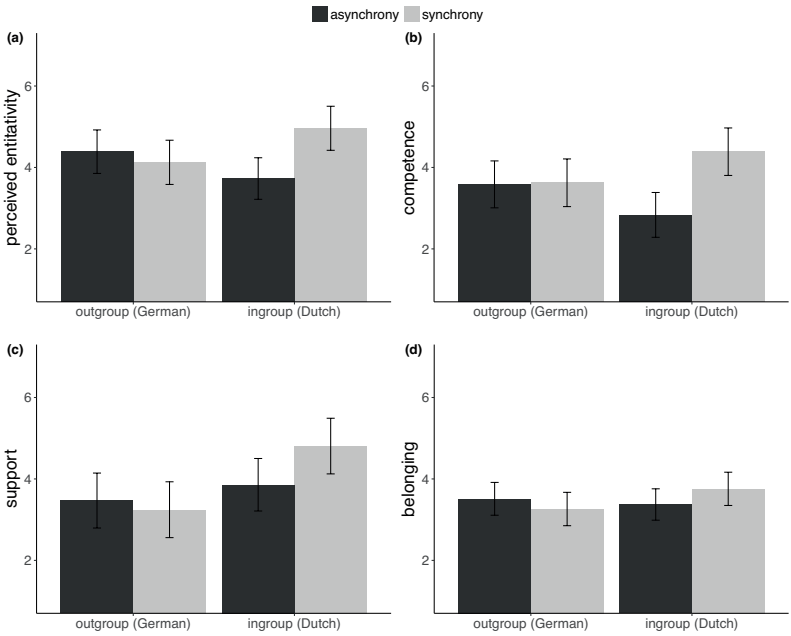


Figure 1. Experiment 1: Interaction effects with 95%CI's of social identity and synchrony on perceived entitativity (a), competence (b), support (c), and belonging (d).
Adjusted means are presented at the mean value of pre-identification ($M_{pre\text{-}identification}$ = 5.14).

Table 1. Adjusted means and standard errors for the dependent variables from Experiment 1.

	Condition							
	Outgroup (German)				Ingroup (Dutch)			
	Asynchronous		Synchronous		Asynchronous		Synchronous	
	M	*(SE)*	*M*	*(SE)*	*M*	*(SE)*	*M*	*(SE)*
Perceived entitativity	4.39	(0.27)	4.13	(0.27)	3.77	(0.26)	4.96	(0.27)
Competence	3.58	(0.29)	3.62	(0.29)	2.83	(0.28)	4.39	(0.29)
Support	3.47	(0.34)	3.24	(0.34)	3.86	(0.32)	4.81	(0.34)
Belonging	3.51	(0.20)	3.26	(0.21)	3.37	(0.19)	3.76	(0.20)

All means are adjusted at the mean value of pre-identification ($M_{pre\text{-}identification}$ = 5.14).

Social perception

For perceived entitativity, we found a main effect as hypothesised, although only marginally significant, for synchrony on perceived entitativity. Participants in the synchrony conditions perceived slightly more (M = 4.54, SE = 0.19) unity among the target group than participants in the asynchrony condition (M = 4.06, SE = 0.19), $F(1, 70) = 3.20$, $p = .078$, $\eta^2 = .04$. No main effect was found for target group or pre-identification, Fs < 1, *ns*, but there was a significant interaction between synchrony and target group, $F(1, 71) = 7.92$, $p = .006$, $\eta^2 = .10$. When we look at the simple main effects, we see that there is no effect of synchrony when participants watched an outgroup, $F < 1$, *ns*, but when participants watched the ingroup, they perceive more unity when the target ingroup moves in synchrony as opposed to when they move out of synchrony, $F(1, 70) = 10.92$, $p = .002$, $\eta^2 = .14$.

We found a main effect of synchrony on perceived competence, participants who watched the target group move in synchrony found the target group more competent (M = 4.01, SE = 0.21) than participants who watched the target group move out of synchrony (M = 3.21, SE = 0.20), $F(1, 70) = 7.36$, $p = .008$, $\eta^2 = .10$. No main effect for target group was found, $F < 1$, *ns*, and only a marginally significant effect of pre-identification, $F(1, 70) = 2.99$, $p = .088$, $\eta^2 = .04$. However, there was an interaction effect of synchrony and target group, $F(1, 70) = 6.97$, $p = .010$, $\eta^2 = .09$. Looking at the simple main effects we found no evidence for an effect of synchrony when watching the target outgroup, $F < 1$, *ns*, only

in the ingroup condition participants in the synchrony condition ascribe more competence to the target group than participants in the asynchrony condition, $F(1, 70) = 14.85$, $p < .001$, $\eta^2 = .18$.

Relations to the target group

For support, we found no evidence for a main effect of synchrony or pre-identification, $F < 2$, *ns*. However, as expected we found a main effect of target group; participants who watched the ingroup supported the target group more ($M = 4.33$, $SE = 0.24$) than participants who watched the outgroup ($M = 3.36$, $SE = 0.24$), $F(1, 70) = 8.48$, $p = .005$, $\eta^2 = .11$. Furthermore, the interaction effect between synchrony and target group was marginally significant, $F(1, 70) = 3.06$, $p = .085$, $\eta^2 = .04$. Simple main effects reveal that when watching the outgroup, synchrony did not affect levels of support for the target group, $F < 1$, *ns*. However, when watching the ingroup, participants who watched the ingroup move in synchrony supported the target group more than participants who watched the target ingroup move out of synchrony, $F(1, 70) = 4.05$, $p = .048$, $\eta^2 = .05$.

We found no effects for belonging, all F's < 3, *ns*. However, when excluding one outlier from the asynchrony ingroup condition (with $z_{res} = 3.46$), we found a significant interaction between synchrony and target group, $F(1, 69) = 4.49$, $p = .038$, $\eta^2 = .06$. Looking at the simple main effects, we found no effect of synchrony for participants who watched the outgroup, $F < 1$, *ns*. However, in line with our expectations, participants who watched the ingroup felt more belonging with the target group when they moved in synchrony than participants who watched the ingroup move out of synchrony, $F(1, 69) = 4.54$, $p = .037$, $\eta^2 = .06$.

Discussion

The aim of this first exploratory experiment was to test whether our experimental set-up worked as we had hoped. Firstly, participants were susceptible to the textual manipulation of the target group's identity (only two participants failed the manipulation check) and the visual manipulation of synchrony (only one participant saw synchrony in the asynchrony condition). However, the synchrony condition seemed to have been judged to be out of synchrony by some

participants. We believe this is because the individuals in the video displayed exercises that were not perfectly synchronized in time. And indeed, based on the effects we found, we can conclude that the synchrony conditions were perceived differently by the participants. Secondly, we were interested whether the target group's identity and the intergroup context under investigation was relevant to the participants. The pre-identification with Dutch students (overall $M = 5.14$) suggests that this is indeed relevant. Given the results we found on the other measures we are certain that the intergroup context, a student football competition, was sufficiently relevant to the participants. Experiment 1 thus provides assurance that the experimental design is valid.

As mentioned, the main purpose of this experiment was explorative. The power in this experiment was low and conducting an experiment with a larger sample is necessary before we can draw definitive conclusions. Nevertheless, the results provide an initial indication of the direction of effects. With respect to the results, we find similar effects for our main dependent variables perceived entitativity and competence. Main effects were found that are in line with hypothesis (H1), however, the presence of interaction effects is more consistent with the alternative hypothesis (H1a) that synchrony effects would be more pronounced in the ingroup than in the outgroup. For the relationship with the target group, there was a main effect of target group, consistent with H2: participants supported the target ingroup more than the target outgroup. However, for those who observed the ingroup, synchrony also affected support positively (consistent with H2a). The measure of belonging seems to show the same pattern although this was not significant. This suggests that synchronous movement is most informative when an ingroup is observed. Participants perceive an ingroup team as more entitative and competent, and feel more support for and belonging with them when they move in synchrony. These results should not be considered tests of the hypothesis, but they do speak to the potential effectiveness of the design.

Experiment 2

The second experiment was a replication of Experiment 1. We used the same experimental set-up, including the stimulus material. However, we chose a different intergroup distinction, namely Germany and Spain. This was done

because at the time of the experiment the Dutch national football team did not qualify for the UEFA Euro 2016. We were afraid that this could affect judgement of and identification with Dutch football teams more generally. Our sample in this experiment was therefore German. After pilot testing several outgroup options we chose Spain as a relevant outgroup in the context of football.

Method

Participants

Data was collected from 124 participants (82 female, 40 male, 2 unknown, M_{age} = 20.48, *SD* = 1.76)[4]. The participants were all Germans living (mostly studying) in the Netherlands (one participant did not study). Again, the experiment had a 2 (synchrony: synchronous vs. asynchronous) x 2 (target group: ingroup vs. outgroup) between-subject design (ingroup synchrony condition, *n* = 32, ingroup asynchrony condition, *n* = 29, outgroup synchrony condition, *n* = 33, and outgroup asynchrony condition, *n* = 30).

Procedure and materials

The procedure was the same as in Experiment 1. After the introduction, as in Experiment 1 *pre-identification* was measured with seven items on a 7-point Likert scale, however this time with Germans (and not German students, Cronbach's α = .80, Leach et al., 2008).

Next the participant read a short text about an amateur international football competition organised for students. Participants read that both a German and a Spanish team had signed up for the competition. Depending on the condition they were in, they read a text saying they would get to see a video of the German [Spanish] teams warming up before a game against the Spanish [German] team. The same videos were used as in Experiment 1.

After watching the video perceived entitativity, competence, support, and belonging were measured on a 7-point Likert scale. This time, *perception of entitativity* among the target group was measured with four items (Cronbach's α = .86). Another four items measured *competence* of the target group, e.g., 'I

4 Again, the aim was to collect data among 128 participants (see footnote 1). Post hoc power calculation revealed that with *N* = 124 the power to detect medium sized effects (with two-sided tests and alpha of .05) is .79.

feel like the football team I saw in the video is competent' (α = .90). Four more items measured *support* for the target group; e.g., 'I would support the team I saw in the video in their next game" (α = .89). Next, four items measures feeling of *belongingness* with the target group (α = .82, Need Threat Scale, Van Beest & Williams, 2006).[5]

Some manipulation checks and control questions were asked. Participants were asked what the nationality of the football team in the video was and whether they moved in or out of synchrony, see Experiment 1. Finally, demographic information was acquired from the participants; nationality, age, gender, and whether and what they studied. Lastly, participants could give final remark and were textually debriefed.

Exclusion criteria

Four participants were excluded because they indicated that they were not German or had dual nationality (all in the asynchrony condition, three in the outgroup and one in the ingroup condition). Another fifteen participants had the nationality of the target group wrong (or did not know; outgroup asynchrony condition $n = 4$, outgroup synchrony $n = 2$, ingroup asynchrony $n = 3$, and ingroup synchrony $n = 6$). Three participants in the asynchrony condition indicated they saw synchrony (one in the outgroup and two in the ingroup condition). In the synchrony condition, there were 33 participants who either indicated they saw asynchrony or who did not know whether it was synchrony or asynchrony (17 in the outgroup and 16 in the ingroup condition). Again, we believe that the athletes in the synchrony condition did not display perfect synchrony and that therefore people did not judge it as being synchrony.

5 Measures for mood (pre- and post-), post-identification with the overarching ingroup category (Germans), empathy and sympathy with the target group were included in the questionnaire. As mentioned before, we found no significant effects on mood and identification. The other measures are not central to this paper. Therefore, we do not present these is this paper. Furthermore, like Experiment 1, the cooperation task (Wiltermuth & Heath, 2009) with ostensible other ingroup participants was included. This time 59 participants indicated that they had not understood the game and/or could not answer the question about an example scenario correctly. We decided to omit the results from this data from this paper because the power to detect differences would be too low and because this high number raises concerns about whether results would be meaningful. For the same reason, we do not present the results of the trust measure which was completed after introducing the task.

However, this does not mean that the participants did not pay attention. Therefore, these participants were not excluded from the analysis. However, those who judged the asynchronous target group as being synchronous were excluded from analysis as this signals lack of attention. Finally, data from 103 participants was analysed.

Results

Analysis were performed as in Experiment 1 and, again, all analyses were performed with pre-identification with Germans as a moderator (data are presented in Table 2 and Figure 2). All two-way and the three-way interactions were initially included in the analysis, but when an interaction term was not significant, it was removed. Unless otherwise mentioned, results are presented without these interaction terms because they were not significant.

Table 2. Adjusted means and standard errors for the dependent variables from Experiment 2.

	Condition							
	Outgroup (Spanish)				**Ingroup (German)**			
	Asynchronous		**Synchronous**		**Asynchronous**		**Synchronous**	
	M	***(SE)***	***M***	***(SE)***	***M***	***(SE)***	***M***	***(SE)***
Perceived entitativity	3.45	(0.21)	4.64	(0.18)	3.51	(0.20)	4.48	(0.20)
Competence	3.78	(0.20)	4.31	(0.17)	3.62	(0.19)	3.99	(0.19)
Support	3.07	(0.24)	3.34	(0.20)	3.58	(0.23)	3.74	(0.22)
Belonging	2.38	(0.24)	2.26	(0.20)	2.27	(0.23)	2.52	(0.22)

All means are adjusted at the mean value of pre-identification ($M_{\text{pre-identification}} = 4.36$).

Social perception

We found a main effect of synchrony on perceived entitativity, participants who watched the target group move in synchrony perceived more entitativity ($M = 4.56$, $SE = 0.13$) than participants who watched the target group move out of synchrony ($M = 3.48$, $SE = 0.15$), $F(1, 98) = 28.67$, $p < .001$, $\eta^2 = .23$. All other effects were not significant, Fs < 2, *ns*.

We also found a main effect of synchrony on competence; participants that watched the target group move in synchrony judged them to be more

competent ($M = 4.15$, $SE = 0.13$) than participants who have watched the target group move out of synchrony ($M = 3.70$, $SE = 0.14$), $F(1, 98) = 5.66$, $p = .019$, $\eta^2 = .06$. All other effects were not significant, Fs < 2, *ns*.

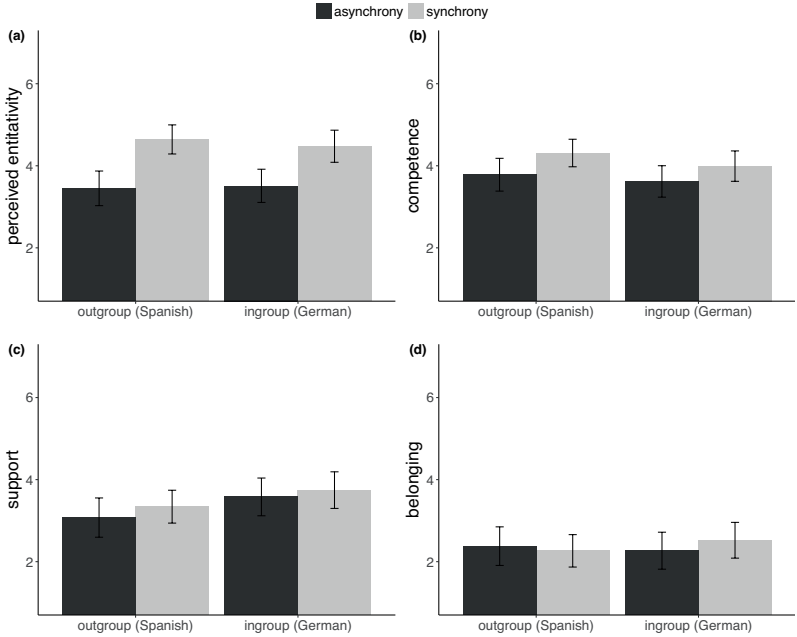


Figure 2. Experiment 2: Interaction effects with 95%CI's of social identity and synchrony on perceived entitativity (a), competence (b), support (c), and belonging (d). Adjusted means are presented at the mean value of pre-identification ($M_{pre\text{-}identification} = 4.36$).

Relations to the target group

For support we found a main effect of target group: participants who watched the ingroup supported the target group more ($M = 3.66$, $SE = 0.16$) than participants who watched the outgroup ($M = 3.21$, $SE = 0.16$), $F(1, 97) = 4.10$, $p = .046$, $\eta^2 = .04$. Unexpectedly, we also found a marginally significant main effect of synchrony, participants who watched the target group move in synchrony supported the target group somewhat more ($M = 3.54$, $SE = 0.15$) than participants who watched them move out of synchrony ($M = 3.33$, $SE = 0.17$),

$F(1, 97) = 3.89$, $p = .051$, $\eta^2 = .04$. The interaction effect between target group and synchrony was not significant, $F < 1$, *ns*. However, there was a significant interaction between synchrony and pre-identification, $F(1, 97) = 4.76$, $p = .032$, $\eta^2 = .05$, see Figure 3. Simple main effects of synchrony on support with pre-identification +/-1*SD* show that participants with low pre-identification (-1*SD*) the effect of synchrony is not present, *F*s < 1, *ns*. However, participants with high pre-identification (+1*SD*) supported the target group more when they move in synchrony than out of synchrony, $F(1, 97) = 4.78$, $p = .031$, $\eta^2 = .05$. Unlike Experiment 1 we found no effects for belonging, *F*s < 1, *ns*.

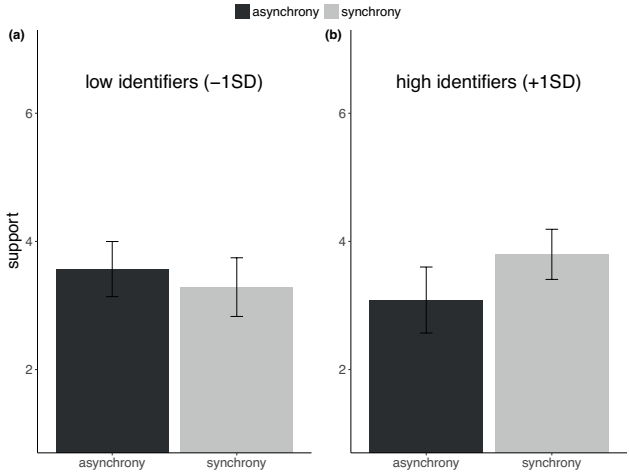


Figure 3. Experiment 2: Main effects with 95%CI's of synchrony on support for low identifiers (a) and high identifiers (b).

Discussion

The results from this experiment show support for our prediction of a main effect of synchrony (H1). A target group that moved in synchrony instead of asynchrony was perceived as more entitative and more competent, irrespective of whether the target group was an in- or out-group. For the relationship with the target group we found some support for a main effect of target group (H2). Observers supported the target ingroup more than the target outgroup. However, we also found a marginally significant effect showing that observers

supported a target group moving in synchrony more than a target group moving out of synchrony. This effect was found for the ingroup was well as for the outgroup (inconsistent with H2a). For belonging we found no effects. In sum, synchrony influenced social perceptions whereas sharing a social identity influenced the relationship with the target group.

The fact that the results from this experiment differ somewhat from Experiment 1 could be due to the better power, but it could also be due to changing the intergroup context. Perhaps the dynamics between the German and Spanish nationality is different than the Dutch and the German nationality. Furthermore, some participants indicated that the target group moved out of synchrony when in fact they moved in synchrony. We think this was because the displayed synchrony was not perfect. Experiment 3 was designed to address these issues.

Experiment 3

For this replication experiment, we decided to go back to the intergroup context from Experiment 1 (Dutch vs. German) and make new stimulus material in which the distinction between synchrony and asynchrony was clearer. That is to say, we made a longer video in with the differences in synchrony were more explicit. Participants were therefore exposed to a longer video of a team who were tightly synchronized in time (or not at all). To add to the strength of the manipulation, team members in the video wore the same tunic.

Experiment 3 also had additional measures. The previous studies focused on competence, entitativity and affiliation. One could suggest that the different effects of observing synchrony from the in- or outgroup (H2a) are most clearly reflected in the experience of threat. We included a measure of threat from the target group (i.e., do they perceive the target team as threatening), and a measure of experienced threat to the ingroup team (i.e., do they fear that their ingroup will lose). We predict results in line with the social perception measures for threat from the target group; synchrony is more threatening than asynchrony, irrespective of whether the target group is an in- or an outgroup. For threat to the ingroup, however, we expect an interaction effect between synchrony and target group. An outgroup moving synchronously and an ingroup moving asynchronously are threatening to the ingroup as this is a

danger to the ingroup's status. In contrast, an outgroup moving asynchronously and an ingroup moving synchronously should not pose a threat to the ingroup.

Method

Participants

Data were collected from 135 participants (109 female, 26 male, M_{age} = 19.53, *SD* = 2.34)[6]. The participants were all Dutch students. The experiment had a 2 (synchrony: synchronous vs. asynchronous) x 2 (target group: ingroup vs. outgroup) between-subject design. Thirty-four participants were randomly assigned to conditions (thirty-three for the ingroup asynchrony condition).

Procedure and materials

The procedure was similar to Experiment 1 and 2. After a short introduction seven items pre-measured *identification with Dutch students* on a 7-point Likert scale (Cronbach's α = .73, Leach et al., 2008).

Next the participant was presented a short text about the so-called international football championship for students (IFCS). According to the texts the IFCS was held every year and student football team from all over the world entered this competition. This year the championship was held in the Netherlands, and the opening game was between the Dutch and the German team. Participants read that they would watch a training session. The team was said to be either Dutch or German depending on the condition they were in. The videos showed four male actors in team tunics (neutral colours of yellow and white) doing several warming-up exercises (e.g., jumping jacks, squads, and jogging). In one video the athletes did all the exercises in synchrony and in the other video they did the exercises out of sync. All exercises and the order in which they were shown were the same in both videos, which lasted 2:24 minutes (accompanying music was "Crispy Bacon" by Laurent Garnier). To strengthen the manipulation, a national flag and text stating the nationality of the team was added in the first seconds of the video.

After watching the video several items were added in random order to measure perceptions of entitativity, competence of the target team, support for the target team, feelings of belonging with the team, and threat from the

6 Post hoc power calculation revealed a .82 power to detect medium sized effects.

target team. *Perception of entitativity* among the target group was measured with four items (α = .94, Jans et al., 2011; Lakens, 2010; Lakens & Stel, 2011); e.g., 'There is a sense of togetherness among the members of the team in the video'. Four items measures *competence*, e.g., 'I think the football team from the video has the skills to win" (α = .91). Five items measured *support*, 'I would support the football team from the video during the competition' (α = .90). Next, five items measured feeling of belonging with the target group; e.g., 'I felt connected with the football team in the video' (α = .71, Need Threat Scale, Van Beest & Williams, 2006). Four items measured threat from the target group (α = .82); e.g., 'the football team in the video looks threatening'.

The next set of items was also randomized. Eight items measured threat to the ingroup (α = .93); e.g., 'after seeing the video I am worried whether the Dutch team can win'. One single item measured identification with the Dutch student football team and another item with the German student football team; 'I identify with the Dutch [German] student football team' (Postmes et al., 2013). Some manipulation checks and control questions were asked. First, participants were asked to write down the nationality of the athletes in the video. Secondly, they were asked on a scale from 1 (completely disagree) to 7 (completely disagree) whether the football team in the video moved 'in synchrony (everyone did more or less the same at the same time)' and 'not in synchrony (everyone moved in a different tempo)'. Lastly, native language, nationality, optional second nationality, gender, age, and study were asked. Finally, participants were given an opportunity for remarks and were debriefed.

Exclusion criteria

All participants who spent less than 100 seconds (1 minute and 40 seconds) on the video page were excluded. This was one participant from the outgroup asynchrony and one from the ingroup synchrony. Furthermore, eight participants were excluded because they were not able to correctly identify (or were not sure about) the nationality of the target group. This was one participant from the outgroup synchrony, two from the outgroup asynchrony, three from the ingroup synchrony, and two from the ingroup asynchrony condition. Next, two participants were excluded who indicated that their second native language was German, one from the outgroup and one from the ingroup asynchrony

condition. Lastly, there were several participants who were unable to recognize (a)synchrony. One participant in the ingroup asynchrony condition found the team equally synchronous as asynchronous (both a score of 4). We decided not to exclude this participant as this person did perceive asynchrony. Fourteen participants in the synchrony condition indicated to seem more (or equal) asynchrony than synchrony. Ten of these were from the outgroup condition. It may still be the case, despite having stimulus material with more precise synchrony, that synchrony judgements are harsher. We decided not to exclude these participants as we felt that this is not an indication that these participants did not pay any attention. In the end, data from 123 participants was analysed.

Results

Results are presented in Table 3 and Figure 4. For ease of reading we present the data from the social perception measures first and then the measures of the relationship with the target group, instead of in the order it appeared in in the questionnaire.

Table 3. Adjusted means and standard errors for the dependent variables from Experiment 3.

	Condition							
	Outgroup (German)				**Ingroup (Dutch)**			
	Asynchronous		**Synchronous**		**Asynchronous**		**Synchronous**	
	M	***(SE)***	***M***	***(SE)***	***M***	***(SE)***	***M***	***(SE)***
Perceived entitativity	2.47	(0.20)	4.11	(0.20)	2.35	(0.20)	4.29	(0.21)
Competence	2.61	(0.19)	3.42	(0.19)	2.30	(0.19)	3.19	(0.20)
Threat from target group	1.96	(0.14)	2.44	(0.14)	1.84	(0.14)	2.25	(0.15)
Support	2.87	(0.20)	3.02	(0.20)	3.36	(0.20)	3.55	(0.20)
Belonging	2.83	(0.15)	2.92	(0.14)	2.87	(0.15)	3.12	(0.15)
Identification with the target group	1.71	(0.23)	1.85	(0.23)	2.97	(0.23)	3.62	(0.23)
Threat to ingroup	3.11	(0.13)	3.33	(0.13)	5.15	(0.13)	4.78	(0.13)

All means are adjusted at the mean value of pre-identification ($M_{pre\text{-}identification}$ = 5.08).

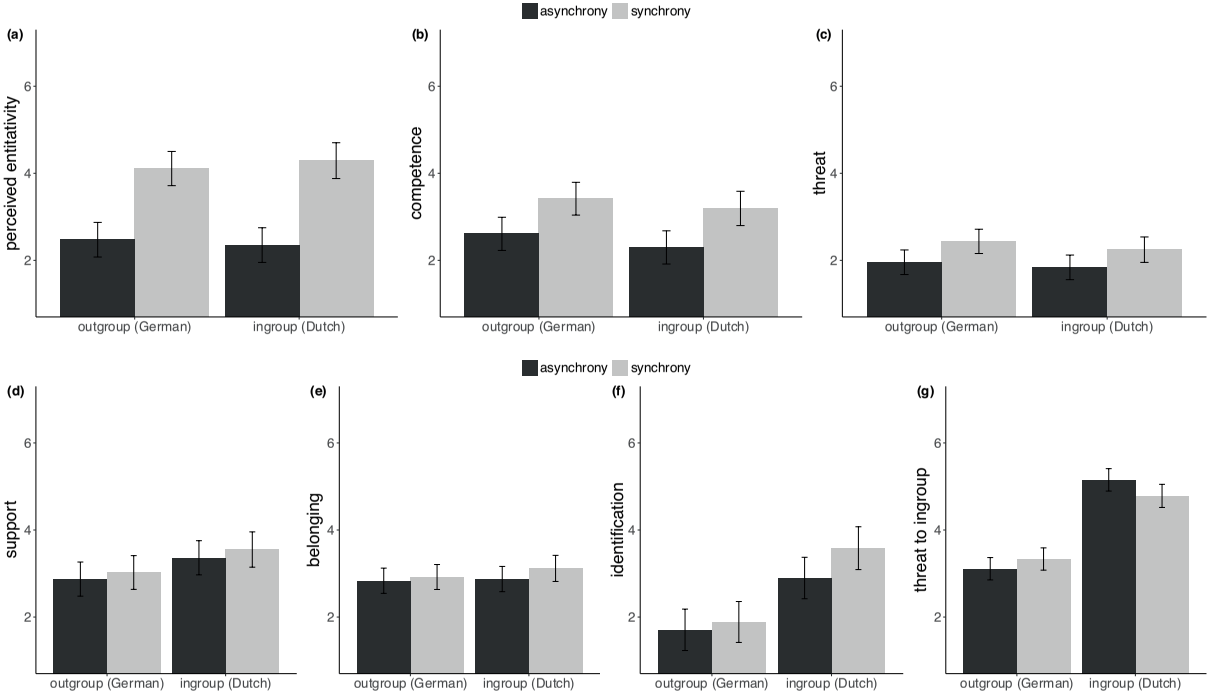


Figure 4. Experiment 3: Interaction effects with 95%CI's of social identity and synchrony on perceived entitativity (a), competence (b), threat (c), support (d), belonging (e), identification (f), and threat to ingroup (g). Adjusted means are presented at the mean value of pre-identification ($M_{pre\text{-}identification}$ = 5.08).

Social perception

As in Experiment 2 we find a main effect of synchrony: more entitativity was perceived by participants who watched the target group move in synchrony (M = 4.20, SE = 0.14) than out of synchrony (M = 2.41, SE = 0.14), $F(1, 118) = 78.10$, $p < .001$, $\eta^2 = .40$. The main effects of target group and the two-way interaction were not significant, Fs < 1, *ns*.

For competence, we find the same pattern: participants who watched the target group move in synchrony perceived the target group to be more competent (M = 3.30, SE = 0.14) than participants who watched the target group move out of synchrony (M = 2.45, SE = 0.14), $F(1, 118) = 19.31$, $p < .001$, $\eta^2 = .14$. All other effects were not significant, Fs < 2, *ns*.

Lastly, we found a main effect of synchrony on threat from the target group; participants who watched the target group move in synchrony perceived them to be more threatening (M = 2.34, SE = 0.10) than participants who watched the target group move out of synchrony (M = 1.90, SE = 0.10), $F(1, 118) = 9.52$, $p = .003$, $\eta^2 = .08$. No other effects were significant, Fs < 2, *ns*[7].

Relations to the target group

As in Experiment 2, we find a main effect of target group on support showing that participants in the ingroup condition support the target group more (M = 3.46, SE = 0.14) than participants in the outgroup condition (M = 2.95, SE = 0.14), $F(1, 118) = 6.50$, $p = .012$, $\eta^2 = .14$. All other effects were not significant, Fs < 2, *ns*. For belonging we found no effects, Fs < 3, *ns*[8].

The measures for identification for the German and Dutch football team had a different meaning depending on which condition one was in; that is, each participant saw only one target group, and thus one of these items always had to be answered about an unknown group. We therefore decided to disregard the measure of identification with the unknown group and instead only use the identification measure of the football team the participant had seen. This new measure reflected target group identification, i.e., the participants' relationship

7 These results remained the same when one outlier (with z_{res} = 3.81) was removed from the analysis.

8 When excluding one outlier (with z_{res} = 3.08) the main effect of pre-identification on belonging became significant, $F(1, 118) = 4.44$, $p = .037$, $\eta^2 = .04$.

with the target group. As expected, this measure showed a main effect of target group on group identification; participants who saw the ingroup identified more with the group (M = 3.24, SE = 0.17) than participants who saw the outgroup (M = 1.80, SE = 0.17), $F(1, 118) = 35.55$, $p < .001$, $\eta^2 = .23$. Unlike support, there was also a marginally significant main effect of synchrony: participants who saw synchrony tended to identify more with the target group (M = 2.74, SE = 0.17) than participants who saw asynchrony (M = 2.30, SE = 0.17), $F(1, 118) = 3.20$, $p = .076$, $\eta^2 = .03$, although this effect was not significant. The effect of pre-identification and the interaction effect between target group and synchrony were not significant, $Fs < 1.10$, *ns*.

Experienced threat to the ingroup

If we look at the experienced threat to the ingroup football team after watching the video, the interaction of pre-identification with the Dutch and target group, and the three-way interaction with pre-identification, target group and synchrony were significant. Only the interaction between pre-identification and synchrony was not significant and was removed. This analysis revealed a significant interaction effect of target group and synchrony, $F(1, 115) = 9.43$, $p = .003$, $\eta^2 = .08$. If we look at the simple main effects separately per target group, we find that, for the outgroup condition there is no effect of synchrony on the experience of threat to the ingroup team, $F < 2$, *ns*. For the ingroup condition there is a marginally significant effect showing that participants who watch the ingroup move out of synchrony feel slightly more threat to the ingroup team than participant who watch the ingroup move in synchrony, $F(1, 115) = 3.88$, $p = .051$, $\eta^2 = .03$.

On top of this, there was a significant two-way interaction between target group and pre-identification, $F(1, 115) = 5.16$, $p = .025$, $\eta^2 = .04$, which was qualified by a significant three-way interaction, $F(2, 115) = 4.16$, $p = .018$, $\eta^2 = .07$. This three-way interaction is displayed in Figure 5. As this figure shows, the effects of synchrony are particularly strong among low identifiers (-1 SD). Low identifiers who watched the outgroup move in synchrony experienced slightly more threat to the ingroup than those who watched them move out of synchrony, $F(1, 115) = 2.92$, $p = .090$, $\eta^2 = .03$. This effect was reversed among low identifiers who watched the ingroup: here moving out of synchrony was

associated with more threat to the ingroup than moving in synchrony, $F(1, 115) = 11.37$, $p = .001$, $\eta^2 = .09$. Among high identifiers these effects of synchrony, interestingly, were not present, Fs < 1, *ns*.

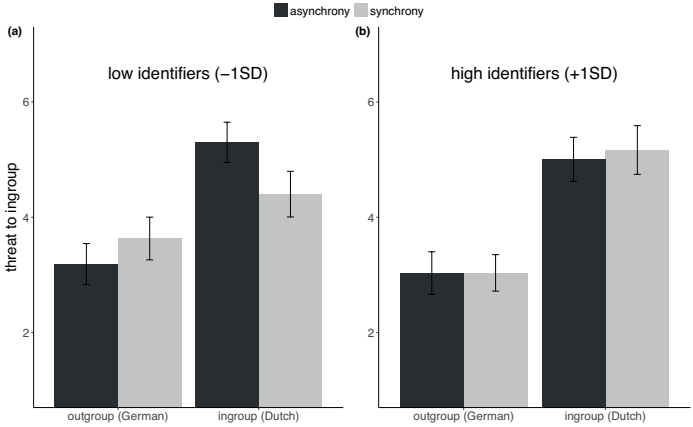


Figure 5. Experiment 3: Interactions effects with 95%CI's of social identity and synchrony on threat to the ingroup for low identifiers (a) and high identifiers (b).

Discussion

The results from this experiment replicate Experiment 2 and support hypotheses 1 and 2. Synchrony, but not the target group's identity, appears to be the important factor in social perception. As predicted, a football team is perceived more entitative, more competent, and more threatening when they move in synchrony (as opposed to asynchrony), irrespective of the target group's nationality (H1). In contrast, in line with H2, support and identification is affected more by group membership than by synchrony. Furthermore, participants tended to identify more with a synchronous group than an asynchronous group, irrespective of what target group they watched. Again, no effects on belonging were found. As expected, we found that in the ingroup condition, participants experienced more threat to the ingroup football team when they saw the target ingroup move out of synchrony. Thus, it seems that the asynchronous movements of the ingroup team threaten their chances to perform successfully. Unexpectedly, this effect of threat was only present

for low identifiers with ingroup students, suggesting that when you identify less with the group, one is more vulnerable to experiencing threat due to low synchrony.

General Discussion

In discussing the results, we will ignore the findings from the underpowered Experiment 1. As indicated above, however, despite the lack of power the results are partially consistent with the results of Experiment 2 and 3.

Overall, using different stimulus material *and* different intergroup contexts, we find a pattern of results that suggest that synchrony is the dominating factor in social perception. Perceptions of entitativity, competence, and threat are higher when synchrony is observed than when asynchrony is observed, irrespective of whether an ingroup or outgroup is observed. This confirms hypothesis H1: It seems that people's social perception is more attuned to responding to coordination within a group than to the shared social identity with that group. However, when it comes to affiliation, such as support and identification, we find that this is predominantly determined by whether the ingroup or outgroup is observed (H2). So, despite finding synchronous moving groups more united, competent, and threatening, one would support their own team irrespective of how well they coordinate their behaviour. However, for identification and support in Experiment 2 (for high identifiers) we also find small main effects of synchrony showing that synchrony leads to slightly more support and identification with the target group than asynchrony. Strikingly, across all studies we find no effects on belonging. This may be due to the nature of this measurement in this context. Support is a common way of expressing affiliation in a football context, whereas belonging might be too strong to express in this context, especially given the fact that it was about a previously unknown football team.

Next, we examined the consequences of observing synchrony from an in- or outgroup to the experienced threat to the ingroup. We predicted an interaction effect of synchrony and shared social identity, such that outgroup synchrony and ingroup asynchrony would be most threatening to the ingroup. This is indeed what we found, although the effect was stronger among low identifiers. High identifiers seem to experience more threat to the ingroup only after watching

the ingroup, but less so after watching the outgroup. This result suggests that perhaps overall the individuals in the video did not appear professional enough to engender confidence in the observer, especially among participants who a priori highly identified with the ingroup. Only for low identifiers threat can be reduced by observing the ingroup move in synchrony (or the outgroup move asynchronously).

In some respects, this research confirms the traditional assumption that people tend to support the ingroup over the outgroup (Tajfel & Turner, 1986; Turner, 1985; Turner et al., 1987). However, in terms of perceived entitativity, competence, and threat from the target group, group membership has very little influence. When information about the group's performance (in terms of synchrony) is available, observers use these behavioural signals to determine the target group's qualities. This is interesting, because it goes against the notion that ingroup bias would lead to a blind favouring of the ingroup over the outgroup, in lieu of any evidence. Across the studies we presented, inferences from synchrony and from group membership did not interact much, suggesting they are separate sources of information.

Limitations and future directions

This research focused on synchrony in football (soccer). Naturally, football is not a sport in which absolute synchrony is present or necessary. We therefore chose to display warm-up exercises, that are not uncommon to be done in synchrony, as a way to express coordinated behaviour. Nevertheless, it may be useful to research a context or sport in which synchrony is naturally present, or research more complex forms of coordination instead.

Furthermore, it may be interesting to test a sample of football fans. This could result in higher overall identification with the ingroup (nationality) and relevance of football, and may also lead observers to attach more meaning to the coordination of behaviour as well as the shared social identity.

Finally, in this research, a competitive intergroup context was made salient. Under these conditions, sharing a social identity plays an important role in determining affiliation with a target group. It is unclear whether the effects we found would also emerge in the absence of intergroup competition. Future research should investigate whether observers are able to affiliate with target

outgroups when no clear intergroup competition is salient. This could shed light on the flexibility of identification processes.

Conclusion

In this research, we show that synchrony influences social perceptions of a target group, irrespective of the relation to participants' own social identity. When groups move in synchrony, they are perceived more like a unit, more skilled, and more threatening, regardless of whether they are in- or outgroup. Nevertheless, when an intergroup context is salient, affiliation with the target group is mainly dependent on group membership and not on synchrony. Despite the importance of social identity in forming bonds with the groups in our social surrounding, synchrony, and more broadly interpersonal coordination is a strong social signal for observers, *and* a way for groups to communicate strength and social unity to in- and outgroup members.

CHAPTER 5

General Discussion

In this dissertation, we set out to explain how bystanders can feel psychologically connected to a group by merely observing it. We have focused on how physical interaction within a target group can communicate solidarity to observers and how this in turn can influence the development of a relationship between observer and target group. Our expectation was, and the research confirmed this, that one does not have to interact with the target group to experience a sense of belonging or involvement with the group. The findings in this dissertation can thus contribute to the understanding of how group boundaries can extend beyond those of a core group of actors to include individuals who are objectively outsiders to it, in the role of bystanders or audiences. Uncovering the social psychological mechanisms that underpin such processes of group growth, offers us insight into the social function of, and the social psychological processes involved in, a variety of group activities that seem to facilitate group bonding, such as collective rituals, performing arts, festivals, sports, etcetera.

We have chosen to investigate these group growth processes among target groups who physically interact, thus relying on body language and not verbal language. We chose body language because we know that people are very good at interpreting nonverbal interactions (e.g., Burgoon et al., 1995; Knapp et al., 2014). In our first empirical line of research, Chapters 2 and 3, our theoretical background was based upon the interactive model of identity formation (Postmes, Haslam, et al., 2005; Postmes, Spears, et al., 2005). This model differentiates two ways of forming a social identity; deductive and inductive social identity formation. Social identities can be formed through top-down, deductive processes when groups are formed around larger categories or through processes of comparing the ingroup to an outgroup (Tajfel, 1978; Tajfel & Turner, 1986; Turner, 1985; Turner et al., 1987). This type of social identity relies on similarities between individual in a group, e.g., sharing characteristics such as nationality, profession, gender, etc. However, the interactive model of identity formation recognizes that groups can also be formed in a bottom-up, inductive manner, through interactions between individuals that are not necessarily similar. Here, understandings of the group and of the collective are formed on the basis of contributions to the group by group members and the social interactions among them (Jans et al., 2011, 2012; Koudenburg et al., 2015; Postmes, Haslam, et al., 2005; Postmes, Spears, et al., 2005). In this

dissertation, we worked with nonverbal interactions and thus relied on the physical manifestation of deductive and inductive social identity formation. We used the term mechanical solidarity to refer to the physical manifestation of deductive identity formation, which is characterized by uniformity of action. We compared this to organic solidarity, the physical manifestation of inductive identity formation, which is characterized by complementarity of action.

In Chapter 2, we investigated how audiences respond to observing displays of solidarity among a group of dancers on stage. We worked with choreographers and dancers to develop, in two field experiments, dance performances that reflected mechanical solidarity, organic solidarity, or an aggregate of individual dancers. The "stimulus material" was performed, during two consecutive years, at a performing arts festival by professional dancers in front of live audiences. This ensured a natural context with ecological validity and value. In the final experiments of Chapter 2 we replicated findings from the field in a lab experiment in which we showed audiences videos of the dance performances. In all experiments, audience responses to these performances were collected through questionnaires. In Experiment 2b we also looked at behavioural consequences of observing solidarity. The behavioural observations were made of audiences who were asked to perform a coordination task (in the form of a game) which they played immediately after watching one of the performances. In this task the audience had to, as a group, move objects through space and replace them at a different location. This task gave us insight in the way audiences cooperated with each other, after seeing one of the three forms of solidarity expressed abstractly on stage.

In Chapter 3, we also used performing arts to investigate the relationship between performers and observers. We created musical performances by letting some participants perform in "airbands" while other participants observed. The participants who were elected to be in the airband either all played air guitar (playing an imaginary guitar) to evoke mechanical solidarity, all played different air instruments to evoke organic solidarity, or did not perform (control condition Experiment 1) or performed solo (control condition Experiment 2). The context of investigation in Chapter 3 is similar to Chapter 2 because both lines of research have the same theoretical framework and look at live artistic performances. However, Chapter 3 provides a unique contribution

to this dissertation in several ways. Firstly, in Chapter 3 we moved to the lab and gained the experimental control necessary to replicate our findings from the field. Secondly, we shifted our attention to investigate both the actors as well as the observers, and how the performances affected the group as a whole. Thirdly, to increase the generalizability of the findings, the research in this chapter was done with amateurs: participants had no professional experience with performing. Lastly, in the second experiment in this chapter we also investigated behavioural consequences of performing and observing solidarity (with a different task than Chapter 2). This time we looked at how active the combined group of performers and observers was during a warm-up for an ostensible competition against other groups.

In Chapter 4 we took a different approach to look at the boundary conditions of the solidarity that observers come to experience when they watch a target group. Here, we were interested in how the social identity of the target group affects the relationship that observers develop with the target group. In this chapter, we did not focus on the distinction between mechanical and organic solidarity, but we merely focused on the presence or absence of mechanical solidarity through coordination in the target group's interactions (synchrony vs. asynchrony). Again, we looked at how observers respond to the interactions of the target group, but we also integrated principles derived from the social identity approach with the synchrony literature (Bernieri, 1988; Bernieri et al., 1994; Lakens, 2010; Launay, Tarr, & Dunbar, 2016; Miles et al., 2011; Tajfel & Turner, 1986; Valdesolo et al., 2010). Specifically, we focused on whether the effects of observing synchrony vs. asynchrony are moderated by watching either target in- or outgroups. In this chapter, we used a new context of investigation; sports. Like performing arts, this context lends itself well for the study of nonverbal interactions and the actor-observer relationship, as well as for intergroup processes. In three lab experiments, we measured the social impact of watching videos of amateur in- or outgroup football players warming up in or out of sync.

Summary of the Findings Across Chapters

Across the research in this dissertation we investigated three aspects of social impact; the perception of solidarity, the experience of solidarity with the target group, and the experience of solidarity among the observers. We hypothesized

that observers would be able to perceive more unity when a target group would express solidarity (through organic, mechanical, or synchronous movements) compared to no solidarity (acting as individuals or not acting at all). Furthermore, we hypothesized that observers would perceive more personal value of each individual when observing organic solidarity compared to mechanical solidarity. Secondly, we hypothesized that, when exposed to solidarity from a target group, observers would also experience more solidarity with the target group than when exposed to an aggregate of individuals. We also hypothesized that personal value would mediate the relationship between displays of organic solidarity and the experience of solidarity. Lastly, we hypothesized that observing solidarity, compared to the absence of solidarity, would lead to more experienced solidarity among observers.

Overall, we found strong support for the notion that observers do not have to be part of a group to experience the social impact of that group. Across our studies, we found that people are able to interpret solidarity that is displayed by a target group. More specifically, in line with our predictions, we found that observers who watched a target group display solidarity (organic or mechanical) through dance or a musical performance or display synchrony during a warm-up, perceived the target group to be more entitative than observers that watched an aggregate of individuals perform or a target group displaying asynchrony during a warm-up. Secondly, observers who watched dancers display organic solidarity, perceived more personal value among the individual dancers than observers who watched dancers display mechanical solidarity or who watched an aggregate of individual dancers (Chapter 2). Parallel to this, we found, in Chapter 3, that actors in the target group that performed organic solidarity in an airband indeed experienced more personal value than actors who performed mechanical solidarity in an airband or did not perform at all.

More importantly, solidarity can transfer from a target group to physically uninvolved observers: Observers who watched a target group display solidarity through dance or music also *experienced* more solidarity (belonging and identification) with the target group than observers who watched an aggregate of individuals (Chapter 2 and Chapter 3, Experiment 2) or a target group that did not interact (Chapter 3, Experiment 1). Chapter 4 offers a first boundary condition to this effect; when an intergroup context is made salient, observers

seem to experience solidarity, in this case support, only with the target group with which they share a social identity, irrespective of the signalling of more or less solidarity through synchrony.

With regard to the process that plays a role in the transfer of solidarity, Chapter 2 and 3 provide insight. In Chapter 3 we showed that *actors* in the target group who displayed organic solidarity experience solidarity because they feel personally valuable to the group as a whole (including the observers). This confirmed our previous findings of within group processes (Koudenburg et al., 2015). Interestingly, we found that these within group processes also explain why bystanders feel connected with groups they observe. We found that, for mechanical displays of solidarity through dance, perceiving entitativity among the target group led observers to experience solidarity and evaluate them positively (Chapter 2). However, for organic displays of solidarity through dance, not just perceived entitativity, but also perceived personal value among the individuals in the target group led to feelings of solidarity with and positive evaluation of the target group (Chapter 2). This suggest that the two forms of solidarity are qualitatively different both in terms of how they are experienced when one is part of it, as well as when one is merely observing it. The same rules seem to apply to actors and observers. This demonstrates that the group formation literature can also be used to explain group processes among observers that are not actually part of the group.

We also hypothesized that when observers would watch solidarity together, this could affect the solidarity that they experience among fellow observers. In our first experiment (Chapter 2, Experiment 1) we did not find support for this idea. In the second experiment (Chapter 2, Experiment 2), we did however find that observer who had watched dancers display solidarity (organic or mechanical) experienced that the audience as a whole was psychologically closer to the dancers than observers who had watched an aggregate of individual dancers. Although this gives some idea that the observers had a shared experience, it does not fully capture the relationship observers experience among one another. Therefore, we gave observers an opportunity to interact after being exposed to the target group. Importantly, we found a difference in how they interacted. In Chapter 2 (Experiment 2b) we gave observers a task in which they had to move objects through space. The task

required planning and coordination. We found that observers who had watched mechanical solidarity, performed this task in a very structured manner from the start. Observers that had watched organic solidarity were less structured at the start, but caught up relatively quickly and performed equally well in the end as those who had watched mechanical solidarity. Observers who had watched an aggregate of individuals seemed unstructured throughout the whole task. This is our first indicator that the transferred solidarity can have an impact on observers that is longer in duration and reaches further than just the individual; it does not only alter the relationship one develops with the target group, it also seems to affect the subsequent relationship one has with the people around them. Interestingly, we changed the task in Chapter 3 (Experiment 2) into a task in which the whole group (actors *and* observers) had to warm-up for an ostensible competition. Here we found that actors and observers of organic solidarity remained active throughout the task, whereas actors and observers of mechanical solidarity and individual performances were equally active at the start of the task, but their activity declined at the end of the task. Here, activity may be a proxy for group commitment (more effort to win the subsequent competition), which suggests that groups in the organic condition were more committed to the group than the groups in the other conditions. From both of these studies we can conclude that the solidarity experienced may affect group behaviour differently depending on task demands. When the task demands structure or coordination, having adopted a mechanical sense of solidarity might be most beneficial whereas when activity or commitment is required, an organic sense of solidarity might be most beneficial.

Lastly, Chapter 4 focuses on a boundary condition of the transference of solidarity between target group and observer: Does the social identity one shares with a target group alter one's perception of and relation to that target group? In a sport context, we looked at how behavioural coordination (synchrony vs. asynchrony) from a target in- or outgroup socially affected observers. We found that synchrony is a key predictor of social perception; a football team warming up synchronously was perceived as more entitative and more competent than a football team warming up asynchronously. However, when it comes to the relationship that observers develop with the target group, social identity is the key predictor. Observers supported and identified with a target group more

when this was their ingroup rather than an outgroup, irrespective of the level of behavioural synchrony. A small effect showed that observers identified slightly more with a target group moving synchronously as opposed to asynchronously (Experiment 3), this is independent from social identity; it occurred for both the in- and the outgroup. Overall, this suggests that social identity is a dominant force in determining the relationship observers develop with a target group. This set of studies adds to our understanding of when and how observers get psychologically involved in the target group's actions. Namely, in the context of a strong intergroup competition experiencing solidarity with a target group may be dependent on sharing a social identity with the target group and less so on the interaction displayed by the target group. Nevertheless, the interaction displayed, i.e., the level of synchrony, still influences how observers perceive the target group.

Implications

What can we learn from the findings in this dissertation? The different lines of research in this dissertation demonstrate that humans are very skilled in socially interpreting interactions from others. As a consequence, our social environment provides a source of information that can determine who we affiliate with and who not. Even though we may not be constantly aware of the richness of social information in our surroundings, our research shows that the social behaviour of those in our immediate environment can have a tremendous impact on our social cognition as well as social behaviour.

The research in this dissertation provides important insights in how people come to identify with large groups. In previous research, it has been suggested that social networks cannot exceed a certain number of members because humans are unable to maintain relationship with more than 150 people (Dunbar, 1992, 1993; Hill & Dunbar, 2003). Therefore, groups formed through an inductive social identity are believed to be limited to this number, because bottom-up identity formation was, until now, conceptualized as requiring interaction between individuals. Large groups were assumed to be formed through top down, deductive identity processes and social categorization, for which interaction or personal acquaintance is not necessary (Tajfel & Turner, 1986; Turner et al., 1987). The current research challenges these notions and

shows that large groups can also be formed through more organic processes that do not require interaction with or participation in the group. We show that merely observing interactive groups can lead observers to feel psychologically part of a group. Thus, large groups do not just form and grow around abstract social categorical features such as distinctive personal characteristics (gender, ethnicity) or shared ideas (religion, ideology). Our research demonstrates that large groups can also emerge when large numbers of people observe small groups interact and come to internalize this group's sense of solidarity (although, in intergroup contexts, pre-existing social identities and categories might still dominate in predicting affiliative tendencies of observers). This way, social networks can exceed the 150 members and include a broad range of other networks. Groups are thus not limited to the interacting members, but can also include an unlimited number of psychologically, but not physically, involved members. This psychological involvement may be a precursor to social and behavioural change, as was suggested by our behavioural findings.

This knowledge is particularly valuable in a world in which people are exposed to more and more groups through media coverage and the internet. In our research, we show that not only live but also video displays of group interactions can affect audiences[1]. This is in line with the literature on parasocial interactions that shows people can identify with (fictional) characters on screen (Giles, 2002). Our research adds to this by showing that in addition to these interpersonal connections, group processes can explain how solidarity can be formed around an interacting target group. This way, television, movies, and

1 For the sake of completeness, we would like to mention that we conducted in this line of research one unpublished experiment that is not included in this dissertation, in which we tried to replicate the findings from Experiment 1 (Chapter 2) with videos. In this experiment, the effects on social perception replicated but not the effects on the relationship with the target group or among observers. That is to say, observers were able to distinguish between the different forms of solidarity, but did not experience solidarity with the target group or fellow observers. We believe that one reason why this experiment was unable to replicate these findings is because the videos of the performances were filmed very statically from a distance and shown on a relatively small screen. This may have reduced the psychological impact and interest of the videos. For Experiment 3 (Chapter 2) we used better filmed performances and a theatre set-up to show this to participants. Here we were able to replicate the findings from Experiment 2, suggesting that the way in which interactions are filmed and displayed can affect the way observers socially respond to it. The three experiments in Chapter 4 also show that it is possible to elicit solidarity through video displays of group actions.

internet more generally can be important sources for socialization, expanding the possibility to be socially affected beyond our interactive social network to include more distal groups. This more inclusive social environment impacts us socially and may make our identities more susceptible to change.

The research in this dissertation also has implications for our understanding of performing arts. Two chapters in this dissertation use performing arts to study social processes and the relationship between bystanders and interactive groups. Our conclusions about the use of performing arts to study social phenomena are twofold. Firstly, dance and performing arts more generally are an appropriate and useful way to simulate and study solidarity and its impact on bystanders. Performing artists are experts in expressing social relationships through movement. Moreover, they have an understanding of the relationship between performers and audiences and ideas about how small alterations in their behaviour might change this relationship. It is therefore valuable to collaborate and share knowledge with experts in the field of performing art. Secondly, our research shows that performing arts can be a catalyst for social change. It is a powerful, and perhaps sometimes underestimated, instrument in reshaping societal relations. From anthropological and other literature (Beeman, 1993; Evans-Pritchard, 1928; Hagen & Bryant, 2003; Orgs, Caspersen, & Haggard, 2016; Seeger, 1994) we know that performing arts are universal and exist in all communities and has a tremendous social function for spectators, performers, and society at large. Nevertheless, this is sometimes forgotten or underappreciated in modern day societies (especially in times of economic downfall). It is therefore important to underline the impact of art for society and its usefulness for scientists to study social phenomena.

Limitations and suggestions for future research

There are some limitations to the research in this dissertation. For one, we have focused our research only on a limited set of contexts; performing arts and sports. These contexts are appropriate to study because they often rely on the presence of an audience and the ability to keep an audience engaged. Studying the relationship between audience and performers thus makes sense in such contexts. But what can this research tell us about other contexts? We can assume that our research applies to any situation in which groups are

reliant on connecting with audiences, such as political campaigns, commercial advertisement, journalism, etcetera. But would our research also apply to mundane, every-day interactions? In Chapter 3 we had regular participants perform in a musical task. And even though they were performing, it was done by amateurs who had no prior knowledge or training in performing or engaging audiences. The results suggest that one does not need to be a performance expert to generate this connection between an interacting group and its observers. Furthermore, past research shows that observers are able to socially interpret every-day interactions (Bernieri, 1988; Bernieri et al., 1994; Lakens, 2010; Lakens & Stel, 2011; Miles et al., 2009b). Although research on these situations is limited, based on these combined findings we expect it to be likely that observers will be able to develop a relationship with a mundane target group through processes similar to the ones described in our studies. Anecdotally, we know people experience such effects when they, for instance, overhear others having a conversation or when they arrive at a party and see others interact. In line with this, it might be interesting to study the differences between live and video displays of interaction. As nowadays many interactions and groups are displayed via a medium, such as internet and television, it is worth looking into the difference between these media and live displays of solidarity.

Another limitation as a result of the contexts which we chose to investigate, is that we investigated only nonverbal interactions. One reason we did this is to remove linguistic complexity from the interactions displayed. Adding language would add different meaning to interactions and even if one would keep the content of language stable but alter the nonverbal elements, it is very likely that similar content would be interpreted differently when the nonverbal signals change. It was therefore a practical decision to, for now, exclude language from our investigations. On top of this, we know that communication is for a large part nonverbal and that humans are very adept to using and understanding body language (Knapp et al., 2014). For these two reasons, we considered it valid to study nonverbal interactions. However, this means we cannot draw conclusions about how content and language interacts with the effects obtained in this research. It may be valuable to include language in future investigations of this phenomenon.

A second limitation in the research described in this dissertation is the fact that the behavioural data was collected among a relatively small number of groups. The behavioural data have to be interpreted with caution because behaviour was only analysed at group level, which reduced the power to detect differences. In order to increase power, in Chapter 3, compared to Chapter 2, we decreased the size of the groups and were thus able to increase the total number of groups. In both Chapter 2 and 3 we found behavioural effects on group level. The fact that we found an effect on the group level is remarkable. It suggests that the group as an interacting whole was affected. Although studying individual behaviour independently of one another in a group task would have increased the power even further, it would not have done justice to the richness of the interaction between individuals. We therefore believe our group level analysis offers valuable insight into precisely what we were interested in; group processes. Furthermore, we have studied behaviour using two varying tasks; a task that requires coordination and structure and a task that required activity. For the structure task, we found that compared to groups who had been exposed to an aggregate of individual dancers, groups who had been exposed to mechanical or organic solidarity behaved more structured, although this was established much faster for groups who had been exposed to mechanical solidarity. Conversely, for the activity task, groups who had performed or observed organic solidarity (compared to mechanical solidarity of solo performances) maintained most activity during group interaction. This suggests that both forms of solidarity have benefits for the group's performance, however, the benefits seem to be domain specific. To further develop an understanding of the (mis)match between group dynamics and task, additional research could investigate which tasks benefit most from which social structure within a group. It may for example be possible that groups that have a mechanical sense of solidarity perform well in tasks in which similarity or conformity is required whereas groups that have a sense of organic solidarity perform well in task in which divergence of opinions and unique input is required (see also the creativity task in Koudenburg et al., 2015).

Lastly, our ideas on the impact of solidarity on observers are based on the interactive model of identity formation (Postmes, Haslam, et al., 2005; Postmes, Spears, et al., 2005). This model distinguishes between deductive routes

to identity formation, i.e., through similarity and sharing of characteristics, and an inductive route to identity formation, i.e., through interactions and interdependencies. We have used mechanical and organic solidarity respectively to refer to the behavioural manifestation of these types of identity formation. By distinguishing these two routes to solidarity throughout most of this dissertation we do not aim to convey that these are mutually exclusive, nor that they are the only way in which groups can be formed and expressed. Groups can at any time have characteristics of both mechanical and organic solidarity, and can easily shift from one to the other over time. Furthermore, groups can take other forms that do not rely on the mechanical and organic distinction (e.g., Fiske, 1992). Future research could study different forms of community and relationships and their social impact on bystanders.

Conclusion

In sum, the research in this dissertation provides insight into how humans adapt to their social surroundings by interpreting and internalizing solidarity. New social structures can emerge and be reshaped through exposure to interacting groups. In this way, groups can grow beyond the interactive borders to include those who are not involved in the interactions. This group expansion does not have to occur through the traditional processes of social categorization, but can also emerge through processes of social perception and internalization of solidarity that is displayed by a small group of interacting individuals. The same processes that explain small group formation through interaction, can thus also explain how bystanders psychologically connect to groups they were previously unfamiliar with. These new insights about the psychological flexibility of group formation and growth may help us understand how societies form and evolve.

S

Supplementary material

Chapter 2

Briefing choreographers – Introduction to the theory

Distinguishing three types of community

1. Communities based on "organic solidarity"

In some communities and groups, every individual contributes their own distinctive skills, actions and personality. The successful combination of these individual inputs creates a sense of unity: the feeling that the whole has become more than the sum of its parts. In these communities, individual contributions are positively valued.

2. Communities based on "mechanical solidarity"

In some communities and groups, individual members appear to outdo each other in expressing the group's norms and culture. Here too, we can find a strong belief that the group is more than the sum of its parts. But the collective ideas of what the group is like (or should be like) shape the actions of every individual: Being a good group member means publicly displaying one's membership.

3. The absence of a sense of community

There are occasions in which a sense of community is irrelevant or absent. Whether community members act as individuals or attempt to be collectivistic, others simply attach no positive or negative value to what they do. Although social interactions may be superficially maintained, underlying relationships are treated with indifference.

Examples

One may attempt to find examples of different groups that fall into each category. There are many. But one may also recognize these characteristics in the same groups, but at different times.

Many groups "feel" as if they are organic communities, at least some of the time. In a village community or in a small city, for example, organic solidarity is strengthened if there is a baker, a butcher, a greengrocer, a pub, etc. But also in the scientific community, different perspectives and approaches create a more vibrant research environment.

At some moments and occasions, these very same groups may "feel" very differently, and display characteristics of a mechanical community. In the same village, there may be an annual village party in which all residents wear traditional clothes, sing the village anthem, or engage in other activities that express the village culture. In the scientific community, we have graduation ceremonies at which every graduate wears a gown and celebrates the completion of their degree in customary fashion. At such occasions, the individual strives to express what it means to be a good group member—individual identity is pushed to the margins of our awareness.

Finally the very same communities may sometimes lose their community feel altogether. The individuals in our hypothetical village and the scientific community might feel that they are engaged in a struggle for survival (because of bad harvests or publication pressures) and this might cause people to care mainly for themselves. Alternatively, some traumatic event (suspected child abuse or scientific fraud) may severely reduce trust.

Dancing three types of community into existence?

Designing the experimental performance

The purpose of the study is to attempt to evoke these feelings of community in the audience. The challenge is to do this using *only physical expression*. In other words, the object is to communicate different forms of community spirit (or its absence) through physical movement.

We expect that it will already be a learning experience to see how you create the performance. We are really interested in your understandings of creating emotional responses in the audience. We are looking forward to collaborating with you in this creative phase. But beyond explaining to you what emotional outcome we hope to achieve, we do not want to steer you or influence the creative process.

In creating the performance, there are some important boundary conditions. Maintaining these boundaries is important if we want to show that it is the physical movement that is responded to by the audience. This means that in all three choreographies, we will want to be keeping many things the same. So, if possible, we would like to use the same music, the same amount of active audience participation, the same physical contact between audience and

dancers, same lighting and forms of dress. Also, the different choreographies should be approximately the same duration.

Carrying out the experiment

During the performance, we shall be observing the audience responses to the choreography. The audience will be filmed throughout, and audio recordings will be made of the dancers and of the audience. In addition, we shall ask audience members to fill out brief questionnaires afterwards. And they will have the opportunity to respond verbally to the performance. Similarly, we ask the dancers to fill out a brief questionnaire after every performance. Putting all these different sources of data together, we hope to build a comprehensive picture of how physical movement shapes social communities.

Flyer Experiment 1

Text flyer Experiment 1

Does art have an effect on how we see the world around us? Can a performance change perspectives? Why do people come to the theatre? How do physical movements shape people's perceptions?

How do we even begin to answer these questions? Experiment A is a scientific research/performance created to explore the effects of dance and movement. The project is collaboration between Random Collision and a multidisciplinary research team from the Rijksuniversiteit Groningen. Together they created a performance and you are invited to be the observers in this experiment!

Dates: 15 august | 16 august | 17 august
Times: 17:00-17:30 | 18:00-18:30 | 19:00-19:30 | 20:00-20:30
Location: Noorderkerk
Entrance: free, but ticket is required
Tickets via Noorderzon Festival: www.noorderzon.nl

Researchers RUG
Social Psychology: Tom Postmes, Ernestine Gordijn, Aafke van Mourik Broekman, Namkje Koudenburg
Artificial Intelligence: Tjeerd Andringa

Random Collision
Director: Kirsten Krans
Choreographers/ dancers: Jasmine Ellis, Ido Batash, Fernando Martins, Matan Zamir, Anna Asplind

Questionniare Experiment 1

How did you feel during the performance?

Below you will find three related moods (for example "passive, calm, quiet") and their opposites (for example "active, cheerful, dynamic"). Think back to the performance. To what extent did your mood tend to be more on one side or the other? Indicate this on a scale from 1 to 7 by circling a number. Please indicate how all three moods together describe your state of mind: keep in mind when one or two moods "fit" less well.

1. I felt passive, calm, quiet.	1 2 3 4 5 6 7	I felt active, dynamic, cheerful.
2. I felt unpleasant, not at ease, uncomfortable.	1 2 3 4 5 6 7	I felt pleasant, at ease, comfortable.
3. I felt bored, inattentive, uninterested.	1 2 3 4 5 6 7	I felt aroused, attentive, interested.
4. I felt chaotic, incoherent, disharmonious.	1 2 3 4 5 6 7	I felt structured, coherent, harmonious.
5. I felt spontaneous, thoughtless, free.	1 2 3 4 5 6 7	I felt mindful, conscious, controlled.
6. I felt gentle, small, weak.	1 2 3 4 5 6 7	I felt powerful, big, strong.

What impression did the dancers as a group make during the performance?

Now we want you to fill in the same questions for your impression of the dancers as a group.

7. The dancers were passive, calm, quiet.	1 2 3 4 5 6 7	The dancers were active, dynamic, cheerful.
8. The dancers were unpleasant, not at ease, uncomfortable.	1 2 3 4 5 6 7	The dancers were pleasant, at ease, comfortable.
9. The dancers were bored, inattentive, uninterested.	1 2 3 4 5 6 7	The dancers were aroused, attentive, interested.
10. The dancers were chaotic, incoherent, disharmonious.	1 2 3 4 5 6 7	The dancers were structured, coherent, harmonious.
11. The dancers were spontaneous, thoughtless, free.	1 2 3 4 5 6 7	The dancers were mindful, conscious, controlled.
12. The dancers were gentle, small, weak.	1 2 3 4 5 6 7	The dancers were powerful, big, strong.

The following statements are about your feelings *about the dance group* during the performance. Indicate for each statement to what extent you agree with this on a scale from 1 (strongly disagree) to 7 (strongly agree).

	Strongly disagree						Strongly agree
13. I feel the dancers are a unit.	1	2	3	4	5	6	7
14. I thought there was a sense of togetherness among the dancers.	1	2	3	4	5	6	7
15. Each dancer fulfilled an important role in the performance.	1	2	3	4	5	6	7
16. I believe each dancer was indispensable to the performance.	1	2	3	4	5	6	7
17. The performance would remain the same with one dancer less.	1	2	3	4	5	6	7
18. During the performance I identified with the dancers.	1	2	3	4	5	6	7
19. During the performance I felt as one with the dancers.	1	2	3	4	5	6	7
20. During the performance I felt connected with the dancers.	1	2	3	4	5	6	7
21. I felt like an outsider when I watched the performance.	1	2	3	4	5	6	7
22. During the performance I identified with none of the dancers.	1	2	3	4	5	6	7
23. During the performance there were some dancers I identified with more than with other dancers.	1	2	3	4	5	6	7
24. During the performance I identified with all dancers equally.	1	2	3	4	5	6	7

The following statements are *about the audience* during the performance. Indicate to what extent you agree with this from 1 (strongly disagree) to 7 (strongly agree).

	Strongly disagree						Strongly agree
25. During the performance I identified with the audience.	1	2	3	4	5	6	7
26. During the performance I felt as one with the audience.	1	2	3	4	5	6	7
27. During the performance I had the feeling that I belonged to the audience.	1	2	3	4	5	6	7
28. During the performance I felt connected with the audience.	1	2	3	4	5	6	7
29. During the performance I felt that the audience was a unit.	1	2	3	4	5	6	7
30. During the performance I experienced a sense of togetherness in the audience.	1	2	3	4	5	6	7

The following statements are about *how you experienced the performance.*

	Strongly disagree						Strongly agree
31. The performance made me think.	1	2	3	4	5	6	7
32. I was absorbed by the performance.	1	2	3	4	5	6	7
33. The dancers' movements were contagious.	1	2	3	4	5	6	7
34. During the performance I searched for meaning.	1	2	3	4	5	6	7
35. I felt there was a clear meaning in the performance.	1	2	3	4	5	6	7
36. The performance seemed to be interpretable in only one way.	1	2	3	4	5	6	7
37. I am afraid I did not understand the performance as it was intended.	1	2	3	4	5	6	7
38. I feel that I could experience the performance in my own way.	1	2	3	4	5	6	7
39. I believe the performance can be experienced in different ways.	1	2	3	4	5	6	7
40. I think the performance was directed.	1	2	3	4	5	6	7
41. It seemed as if the dancers were told what to do.	1	2	3	4	5	6	7
42. It seemed as if the dancers spontaneously made their own decisions.	1	2	3	4	5	6	7

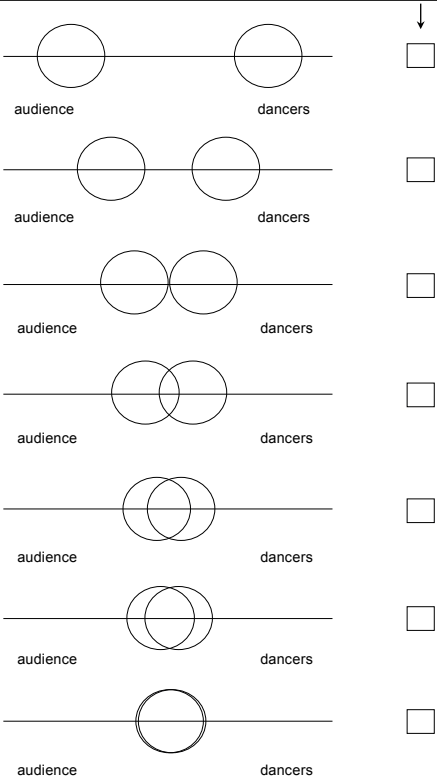
The following statements are about *how you experienced the performance and the audience*. Indicate to what extent you agree with this from 1 (strongly disagree) to 7 (strongly agree).

	Strongly disagree						Strongly agree
43. It is important that the people in the audience experienced the performance in the same way.	1	2	3	4	5	6	7
44. I believe that each person in the audience has experienced the performance in the same way.	1	2	3	4	5	6	7
45. I believe that each person in the audience has experienced the performance in his/her own way.	1	2	3	4	5	6	7
46. I believe I experienced the performance differently than the other people in the audience.	1	2	3	4	5	6	7
47. I am afraid that I experienced the performance differently than the other people in the audience.	1	2	3	4	5	6	7
48. I feel that I can be myself in this audience.	1	2	3	4	5	6	7

The following statements are about your feelings about *the dancers and the audience.*

	Strongly disagree						Strongly agree
49. I felt that the audience and the dancers were a unit during the performance.	1	2	3	4	5	6	7
50. I experienced a sense of togetherness between the audience and the dancers during the performance.	1	2	3	4	5	6	7
51. I have the feeling that the audience and the dancers were as one during the performance.	1	2	3	4	5	6	7

Below you will find seven figures that represent the closeness between the audience and the dancers. Please mark one figure that best describes the closeness between the audience and the dancers *during the performance.*



The following statements and questions are *about modern dance and Random Collision*. Answer the questions or indicate to what extent you agree with this from 1 (strongly disagree) to 7 (strongly agree).

	Strongly disagree						Strongly agree
52. Because of this performance my interest in modern dance increased.	1	2	3	4	5	6	7
53. Because of this performance I am curious about the other activities of Random Collision.	1	2	3	4	5	6	7
54. I would like to subscribe for the newsletter from Random Collision so I am informed about future performances and activities. *(tick a box to indicate your answer)*	☐ yes, subscribe me: e-mail address: …… ☐ I am already subscribed. ☐ no thank you.						

Finally, some questions about *you*.

	Never						Often
55. How often do you participate in cultural activities (museums, exhibitions, concerts, theatre, festivals, film, etc.)?	1	2	3	4	5	6	7
56. How often do you visit dance performances?	1	2	3	4	5	6	7
57. How often do you visit modern dance performances?	1	2	3	4	5	6	7
58. Have you even visited a performance from Random Collision? *(tick a box to indicate your answer)*	☐ no ☐ yes, …… times.						
59. Did you know any of the dancers from the performance? *(tick a box to indicate your answer)*	☐ no (go to question 60) ☐ yes (go to question 59a)						
59a. If so, how well do you know this person/ these persons? *(based on the person you know best)*	☐ barely ☐ somewhat ☐ good ☐ very good						
60. What is your age?	……						
61. What is your gender?	……						
62. What is your nationality?	……						

63. Do you have any comments you would like to add?

64. What, according to you, is the purpose of this study?

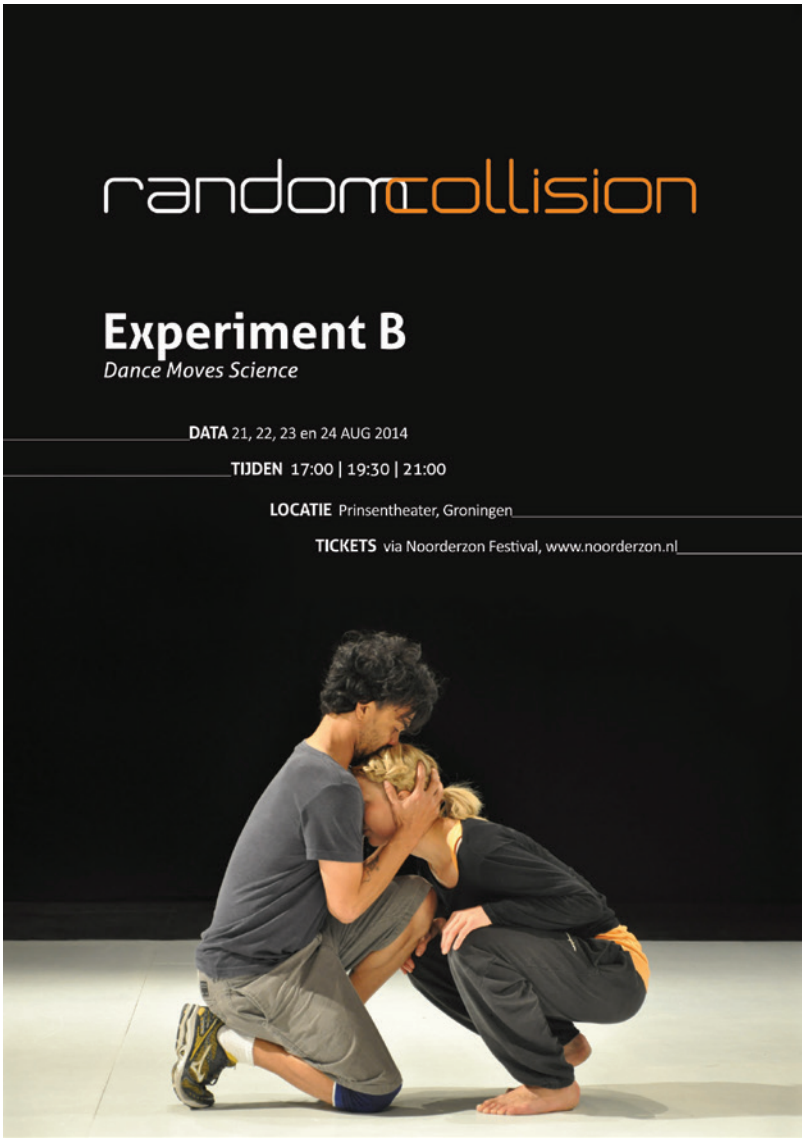
65. Date and time performance: Seat number:

This is the end of the questionnaire. Did you answer all the questions?

You can leave this questionnaire underneath your seat. Please remain seated until further instructions.

Thank you very much for your participation!

Flyer Experiment 2 (front and back)



www.randomcollision.nl

Experiment B

Dance Moves Science

Jouw rol als publiek is om te observeren, toch ben je vaak meer dan 'slechts' een toeschouwer. Een voorstelling kan ontroeren, laten twijfelen of aan het denken zetten. Maar heeft de persoon naast je dezelfde ervaring? De beleving van het publiek vormt de inspiratie voor de dansvoorstelling 'Experiment B', een unieke samenwerking tussen dansplatform Random Collision en een multidisciplinair onderzoeksteam van de Rijksuniversiteit Groningen. Maak deel uit van dit bijzondere experiment door als observator plaats te nemen in het publiek.

Random Collision

Algemeen leider: Kirsten Krans

Choreografen: Jasmine Ellis, Ido Batash, Thomas Falk

Dansers: Anna Asplind, Rozemarijn de Neve, Evelyne Rossie, Daniel Afonso, Miguel do Vale

Onderzoekers Rijksuniversiteit Groningen

Sociale Psychologie: Tom Postmes, Ernestine Gordijn, Aafke van Mourik Broekman, Namkje Koudenburg

Kunstmatige Intelligentie: Tjeerd Andringa

Mede mogelijk gemaakt door:

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Questionnaire Experiment 2a

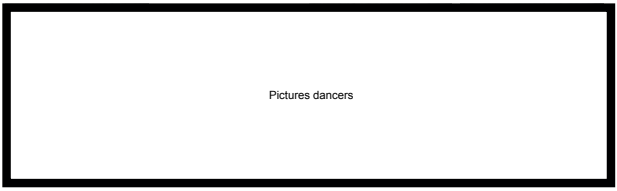
The following statements are *about the dance group* during the performance. Indicate for each statement to what extent you agree with this on a scale from 1 (strongly disagree) to 7 (strongly agree).

	Strongly disagree						Strongly agree
1. I feel the dance group is a unit.	1	2	3	4	5	6	7
2. I thought there was a sense of togetherness among the members of the dance group during the performance.	1	2	3	4	5	6	7
3. The dancers had a lot in common during the performance.	1	2	3	4	5	6	7
4. Each dancer was unique in comparison to the other dancers during the performance.	1	2	3	4	5	6	7
5. Each dancer fulfilled an important role in the performance.	1	2	3	4	5	6	7
6. I believe each dancer was irreplaceable in this performance.	1	2	3	4	5	6	7

The following statements are *about how you experienced your relationship with the dance group.* Indicate to what extent you agree with these statements.

	Strongly disagree						Strongly agree
7. I identified with the dance group during the performance.	1	2	3	4	5	6	7
8. I felt connected with the dance group during the performance.	1	2	3	4	5	6	7
9. I felt excluded when I watched the performance.	1	2	3	4	5	6	7
10. I focused my attention on the performance as a whole rather than on individual dancers.	1	2	3	4	5	6	7
11. I focused my attention on one or more individual dancers in particular.	1	2	3	4	5	6	7

The following statements are *about each dancer separately*. Below the dancers are numbered by means of photographs. Indicate to what extent you agree with the statements.



	Strongly disagree						Strongly agree
12. I felt connected with dancer 1 during the performance.	1	2	3	4	5	6	7
13. I felt connected with dancer 2 during the performance.	1	2	3	4	5	6	7
14. I felt connected with dancer 3 during the performance.	1	2	3	4	5	6	7
15. I felt connected with dancer 4 during the performance.	1	2	3	4	5	6	7

The following statements are *about the relationship between the audience and the dance group*. Indicate to what extent you agree with these.

	Strongly disagree						Strongly agree
16. I had the feeling that a bond developed between the audience and the dance group during the performance.	1	2	3	4	5	6	7
17. I had the feeling that the performance reduced the emotional distance between the audience and the dance group.	1	2	3	4	5	6	7
18. I experienced a sense of togetherness between the audience and the dance group during the performance.	1	2	3	4	5	6	7

The following statements and questions are *about the performance and Random Collision*. Answer the questions or indicate to what extent you agree with the statements.

	Strongly disagree						Strongly agree
19. My overall evaluation of the performance is positive.	1	2	3	4	5	6	7
20. My overall evaluation of the performance is negative.	1	2	3	4	5	6	7

21. Which emotions did the performance evoke? *(describe your emotions with a few keywords)*	…… …… …… ……
22. What did you think the performance was about? *(describe this with a few keywords)*	…… …… …… ……
23. My interest in modern dance increased because of this performance.	1 2 3 4 5 6 7
24. Because of this performance I am curious about the other activities of Random Collision.	1 2 3 4 5 6 7
25. I would like to subscribe for the newsletter from Random Collision so I am informed about future performances and activities. *(tick a box to indicate your answer)*	☐ yes, subscribe me. *(write down your email address on the final page of this questionnaire and hand it in separately)* ☐ I am already subscribed. ☐ no thank you.

Finally, some questions about *yourself*.

	Never						Often
26. How often do you participate in cultural activities? (museums, exhibitions, concerts, theatre, festivals, film, etc.)	1	2	3	4	5	6	7
27. How often do you visit modern dance performances?	1	2	3	4	5	6	7
28. Are you busy with dance yourself?	☐ no ☐ only as an audience ☐ in a recreational context ☐ in an organised context ☐ in a professional context						
29. Have you ever visited a performance of Random Collision?	☐ no ☐ yes, …… times.						
30. Have you visited 'Experiment A' by Random Collision last year at the Noorderzon Festival?	☐ no ☐ yes						
31. Do you know one or more of the dancers from the performance personally?	☐ no (go to question 32) ☐ yes (go to question 31a)						
31a. If so, how well do you know this person/ these persons? *(based on the person you know best)*	☐ barely ☐ somewhat ☐ good ☐ very good						

32. Did you come to this performance alone?	☐ no ☐ yes
33. What is your age?	.....
34. What is your gender?	.....
35. What is your nationality?	.....
36. What is your seat number? *(your seat number is on the back of the clipboard)*	.....
37. Start time performance:	☐ 17h00 ☐ 19h30 ☐ 21h00
38. Your unique code: Write down the first two digits of your birthday here. Write down the last two digits of your phone number here.	☐☐ ☐☐

This is the end of the questionnaire. Did you answer all the questions?

You can leave this questionnaire underneath your seat. Please remain seated until further instructions.

Questionnaire Experiment 2b

The following statements are *about the other visitors and you* during the game RECONSTRUCTION. Indicate for each statement to what extent you agree with it. When we talk about 'the group' we mean the other visitors and you as a group.

	Strongly disagree						Strongly agree
1. I had the feeling that the group was a unit during the game.	1	2	3	4	5	6	7
2. I thought there was a sense of togetherness among the visitors during the game.	1	2	3	4	5	6	7
3. I had a unique contribution to the game.	1	2	3	4	5	6	7
4. I had the feeling I fulfilled an important role in the game.	1	2	3	4	5	6	7
5. I identified with the group during the game.	1	2	3	4	5	6	7
6. I have the feeling I have a lot in common with the group.	1	2	3	4	5	6	7
7. I felt connected with the group during the game.	1	2	3	4	5	6	7
8. I felt like an outsider during the game.	1	2	3	4	5	6	7
9. I had the feeling I belonged to the group during the game.	1	2	3	4	5	6	7

The following statements are *about your assessment of the group (the other visitors and you)* during the game RECONSTRUCTION. Each statement starts with 'During RECONSTRUCTION we were …'. With 'we' we mean the other visitors and you as a group. Indicate to what extent you agree with these statements.

During RECONSTRUCTION we were …	Strongly disagree						Strongly agree
10. … playful.	1	2	3	4	5	6	7
11. … serious.	1	2	3	4	5	6	7
12. … disorganised.	1	2	3	4	5	6	7
13. … organised.	1	2	3	4	5	6	7
14. … active.	1	2	3	4	5	6	7
15. … passive.	1	2	3	4	5	6	7
16. … harmonious.	1	2	3	4	5	6	7
17. … conflictuous.	1	2	3	4	5	6	7

The following questions are *about the mood of the group* during RECONSTRUCTION.

18. How would you describe the mood of the group *during the beginning* of the game? *(describe this with a few keywords)*	…… …… ……
19. How would you describe the mood of the group *during the end* of the game? *(describe this with a few keywords)*	…… …… ……

Lastly, some final questions…

20. Do you have any comments you would like to add?

21. What, according to you, is the purpose of this study?

22. Your unique code: Write down the first two digits of your birthday here. Write down the last two digits of your phone number here. Note! Fill in the same digits as in the first questionnaire. This way we can link your questionnaires without compromising your anonymity.	☐☐ ☐☐

This is the end of the questionnaire. Did you answer all the questions?

You can leave this questionnaire underneath your seat. Please remain seated until further instructions.

Script for voice-over with intructions for the task (both Dutch and English)

[BELL] *Mag ik uw aandacht alstublieft.* [BELL] *May I please have your attention.*

Welkom bij RECONSTRUCTION
RECONSTRUCTION is een spel. Het doel is om een stilleven van de ene kant van de ruimte naar de andere kant van de ruimte te verplaatsen. U moet het stilleven zo exact mogelijk reconstrueren, maar dan aan de andere kant van de ruimte. U krijgt hiervoor 5 minuten. Tijdens het spel geldt maar één regel; op het moment dat u een object van het stilleven hebt aangeraakt, mag u de rest van het spel uw voeten niet meer verplaatsen. Het is alsof uw voeten aan de grond zijn genageld. Andere lichaamsdelen kunt u wél vrij bewegen.

Welcome to RECONSTRUCTION
RECONSTRUCTION is a game. The goal is to move a still life from one side of the room to the other side of the room. You have to reconstruct the still life as accurately as possible, but on the other side of the room. You have 5 minutes to do this. During the game there is only one rule; from the moment you touch an object of the still life you are not allowed to move your feet anymore during the rest of the game. It is as if your feet are nailed to the ground. However, the rest of your body is free to move.

Het spel begint zodra u de bel hoort. En het spel eindigt wanneer u de bel na 5 minuten weer hoort.

The game begins when you hear the bell. And the game ends when you hear the bell again after 5 minutes.

[BELL] [5 minutes silence] [BELL]

De tijd is om. [BELL] *Time is up.*

U wordt vriendelijk verzocht het spel te stoppen. Objecten van het stilleven die u nog vast heeft, kunt op de grond plaatsen op de plek waar u zich bevindt.

You are kindly requested to end the game. Objects of the still life you are still holding, can be placed on the floor at the spot where you are standing.

Het laatste deel van Experiment B vindt plaats in het theater. We vragen u deze ruimte te verlaten en opnieuw plaats te nemen op uw stoel in het theater.
Dank u wel!

The final part of Experiment B takes place in the theatre. We ask you to leave this room and return to your seat in the theatre.
Thank you!

Questionnaire Experiment 3

Code

Before we start the questionnaire, please fill in the following information.

Which seat are you sitting on?

1	6	11	16
2	7	12	17
3	8	13	18
4	9	14	19
5	10	15	

Please fill in the three digit code provided by the experimenter:

Introduction

You just watched a dance performance on screen with the other participant(s). We would like to ask you some questions about the performance and your experience. There are no right or wrong answers; just answer whatever comes to mind first.

While filling in this questionnaire we ask you to remain silent and seated and to not talk to the other participant(s) until everyone is finished.

Click '>>' to continue to the questionnaire.

Affect/appraisal

How did you feel during the performance?

Below you will find related moods (for example "passive, calm, quiet") and their opposites (for example "active, cheerful, dynamic"). Think back to the performance. To what extent did your mood tend to be more on one side or the other? Indicate this on a scale from 1 to 7.

	1	2	3	4	5	6	7	
I felt passive, calm, quiet.	○	○	○	○	○	○	○	I felt active, dynamic, cheerful.
I felt unpleasant, not at ease, uncomfortable.	○	○	○	○	○	○	○	I felt pleasant, at ease, comfortable.
I felt bored, inattentive, uninterested.	○	○	○	○	○	○	○	I felt aroused, attentive, interested.
I felt chaotic, incoherent.	○	○	○	○	○	○	○	I felt structured, coherent.
I felt disharmonious, discoordinated, unbalanced.	○	○	○	○	○	○	○	I felt harmonious, coordinated, balanced.
I felt spontaneous, thoughtless, free.	○	○	○	○	○	○	○	I felt mindful, conscious, controlled.
I felt gentle, small, sensitive.	○	○	○	○	○	○	○	I felt powerful, big, strong.

Now answer the same questions for your impression of the dancers as a group.

What impression did the dancers as a group make during the performance?

	1	2	3	4	5	6	7	
The dancers were passive, calm, quiet.	○	○	○	○	○	○	○	The dancers were active, dynamic, cheerful.

The dancers were unpleasant, not at ease, uncomfortable.		The dancers were pleasant, at ease, comfortable.
The dancers were bored, inattentive, uninterested.		The dancers were aroused, attentive, interested.
The dancers were chaotic, incoherent.		The dancers were structured, coherent.
The dancers were disharmonious, discoordinated, unbalanced.		The dancers were harmonious, coordinated, balanced.
The dancers were spontaneous, thoughtless, free.		The dancers were mindful, conscious, controlled.
The dancers were gentle, small, sensitive.		The dancers were powerful, big, strong.

Perceived Solidarity

Now we will ask you some questions about **the dancers**. The dancers are the four dancers you saw performing in the video.

Click '>>' to continue to the questions.

The following statements are *about the dancers* during the performance. Indicate for each statement to what extent you agree with this on a scale from strongly disagree to strongly agree.

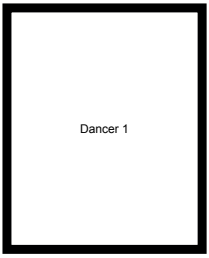
	Strongly Disagree						Strongly Agree
I feel the dancers are a unit.							
I thought there was a sense of togetherness among the dancers.							
Each dancer fulfilled an important role in the performance.							
I believe each dancer was indispensable to the performance.							
The performance would remain the same with one dancer less.							

Solidarity with the dancers

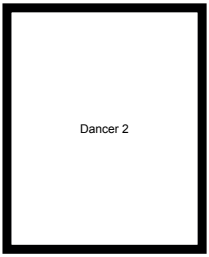
The following statements are about *you and the dancers*. Indicate for each statement to what extent you agree with this on a scale from strongly disagree to strongly agree.

	Strongly Disagree						Strongly Agree
While watching the performance I identified with the dancers.							
While watching the performance I felt as one with the dancers.							
While watching the performance I felt connected with the dancers.							
I felt like an outsider when I watched the performance.							

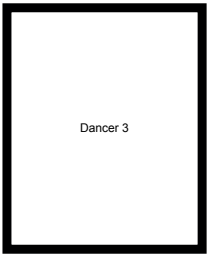
Below you see photos from the dancers from the performance. The dancers are numbered. The following statements are *about how connected you felt with each dancer*. Indicate for each statement to what extent you agree with this on a scale from strongly disagree to strongly agree.



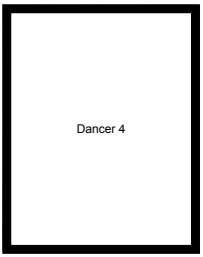
	Strongly Disagree						Strongly Agree
During the performance I felt connected with dancer 1.	○	○	○	○	○	○	○



	Strongly Disagree						Strongly Agree
During the performance I felt connected with dancer 2.	○	○	○	○	○	○	○



	Strongly Disagree						Strongly Agree
During the performance I felt connected with dancer 3.	○	○	○	○	○	○	○



	Strongly Disagree						Strongly Agree
During the performance I felt connected with dancer 4.	○	○	○	○	○	○	○

Solidarity with the audience

Now we are going to ask you some questions about **the audience**. The audience includes you and the other person(s) with whom you watched the dance performance.

Click '>>' to continue to the questions.

The following statements are *about the audience* (you and the other person(s) with whom you watched the performance). Indicate to what extent you agree with these statements.

	Strongly Disagree						Strongly Agree
I identify with the audience.	○	○	○	○	○	○	○
I feel a sense of belonging with the audience.	○	○	○	○	○	○	○
I feel connected with the audience.	○	○	○	○	○	○	○
I experience a sense of togetherness in the audience.	○	○	○	○	○	○	○

Attitude

Now we are going to ask you some questions about **the performance** you watched.

Click '>>' to continue to the questions.

Indicate to what extent you agree with each of these statements *about the performance* you watched.

	Strongly Disagree						Strongly Agree
I think the performance was directed.	○	○	○	○	○	○	○
It seemed as if the dancers were told what to do.	○	○	○	○	○	○	○
It seemed as if the dancers sponteneously made decisions.	○	○	○	○	○	○	○
I think the performance was improvised.	○	○	○	○	○	○	○

The following statements are *about your opinion about the performance* you watched. Indicate to what extent you agree with each of these statements.

	Strongly Disagree						Strongly Agree
I thought the performance was well executed.	○	○	○	○	○	○	○
I enjoyed watching the performance.	○	○	○	○	○	○	○
I thought the movements of the dancers looked professional.	○	○	○	○	○	○	○

What did you think of the performance? Indicate which of the two opposite words best describes your evaluation of the performance on a scale from 1 to 7. 1 indicates that you completely agree with the word on the left. 7 indicates that you completely agree with the word on the right.

	1	2	3	4	5	6	7	
Bad	○	○	○	○	○	○	○	Good
Ugly	○	○	○	○	○	○	○	Beautiful
Sad	○	○	○	○	○	○	○	Happy
Unpleasant	○	○	○	○	○	○	○	Pleasant

The following statements are *about the performance and modern dance*. Indicate to what extent you agree with these statements.

	Strongly Disagree						Strongly Agree
Because of this performance my interest in modern dance increased.	○	○	○	○	○	○	○
I would like to see this performance live.	○	○	○	○	○	○	○
I would like to see other work from these dancers.	○	○	○	○	○	○	○

Demographics etc.

About you

Finally, we have some questions about you.

Click '>>' to continue to the questions.

Please answer the following questions.

	Never					Very Often
How often do you participate in cultural activities? *(for example going to a museum, exhibition, concert, theatre, festival, cinema, etc.)*	○	○	○	○	○	○
How often do you visit dance performances?	○	○	○	○	○	○
How often do you visit modern dance performances?	○	○	○	○	○	○

Did you know any of the dancers in the video?

- ○ Yes
- ○ No

How well do you know this person/these persons? *(answer for the person you know best)*

- ○ Barely

- Somewhat
- Good
- Very Good

Did you know the other participant(s) from this audience (the people you watched the video with) prior to this study?

- Yes
- No

How well do you know this person/these persons? *(based on the person you know best)*

- Barely
- Somewhat
- Good
- Very Good

The performance you watched was part of the 'line-up' of the Noorderzon Performing Arts Festival in Groningen in 2014. The performance was called 'Experiment B'.

Have you seen 'Experiment B' live at the Noorderzon?

- Yes
- No
- I do not know

Have you heard about 'Experiment B'?

- Yes
- No
- I do not know

What have you heard about 'Experiment B'?

What is your age?

What is your gender?

What is your nationality?

How would you rate your English proficiency? (1 = not good at all to 7 = very well)

	Not good at all						Very well
English speaking abilities	○	○	○	○	○	○	○
English reading abilities	○	○	○	○	○	○	○
English listening abilities	○	○	○	○	○	○	○

Do you study?

- ○ Yes, namely:
- ○ No, I do not study.

Are you participating in this study via SONA (1st-year SONA practicum pool) or via PPP (paid participant pool)?

- ○ SONA (for SONA credits)
- ○ PPP (for money)
- ○ Neither SONA or PPP (for money)

What is your (SONA) ID code? (NOTE: This is **NOT** the same as your student number.)

What is your PPP ID code? (NOTE: This is **NOT** the same as your student number).

Are you a 1st-year psychology student?

- ○ Yes
- ○ No

What is your SONA ID code? This is the code you use for the 1e-years SONA practicum pool (NOTE: This is **NOT** the same as you student number, nor the same as you paid participant pool (PPP) ID-code).

What, according to you, is the purpose of this study?

END PAID

This is the end of the questionnaire. Thank you very much for participating in this research.

Please remain silent and seated until everyone is finished with the questionnaire.

PAYMENT

Please click ">>" to be redirected to the payment form.

END SONA

This is the end of the questionnaire. Thank you very much for participating in this research.

Please remain silent and seated until everyone is finished with the questionnaire.

Supplementary figures and tables

Table 1. *Experiment 1: Correlations between measurements*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Perceived entitativity	__												
2. Perceived personal value	.404***	__											
3. Dancers were directed	.271***	.140*	__										
4. Belonging with the dancers	.314***	.325***	-.067	__									
5. Identification with dancers	.148*	.276***	-.136*	.647***	__								
6. Identification with all dancers equally	.125*	.015	.140*	-.229***	-.350***	__							
7. Belonging with the audience	.037	.068	-.012	-.059	-.052	.025	__						
8. Identification with the audience	.010	.008	.058	-.143*	-.092	.084	.655***	__					
9. Entitativity with the audience	.118	.123*	-.097	.131*	.128*	-.104	.656***	.469***	__				
10. Entitativity audience and dancers	.251***	.236***	-.020	.339***	.267***	-.061	.324***	.145*	.487***	__			
11. Closeness audience and dancers	.246***	.283***	-.045	.421***	.279***	-.148*	.159**	.081	.276***	.544***	__		
12. Evoked interest	.334***	.392***	.031	.401***	.313***	-.087	.029	.010	.169**	.238***	.144*	__	
13. Solidarity with the dancers [aggregated]	.287***	.336***	-.095	.968***	.816***	-.287***	-.060	-.136*	.143*	.346***	.412***	.405***	__

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2. *Experiment 1: Mean and 95% confidence interval from the participants' feelings per condition.*

	Condition		
	Individuals ***M [95%CI]***	**Mechanical** ***M [95%CI]***	**Organic** ***M [95%CI]***
Passive, calm, quiet versus active, dynamic, cheerful.	3.09 [2.81;3.36]	3.39 [3.09;3.70]	3.46 [3.15;3.77]
Unpleasant, not at ease, uncomfortable versus pleasant, at ease, comfortable.	4.73 [4.44;5.03]	5.08 [4.80;5.37]	5.05 [4.74;5.37]
Bored, inattentive, uninterested versus aroused, attentive, interested.	5.21 [4.93;5.49]	5.21 [4.94;5.48]	5.15 [4.85;5.46]
Chaotic, incoherent, disharmonious versus structured, coherent, harmonious.	4.28 [3.98;4.58]	4.81 [4.52;5.10]	4.39 [4.03;4.74]
Spontaneous, thoughtless, free versus mindful, conscious, controlled.	4.40 [4.06;4.75]	4.51 [4.21;4.80]	4.58 [4.24;4.92]
Gentle, small, weak versus powerful, big, strong.	4.22 [3.99;4.45]	4.13 [3.92;4.35]	4.32 [4.06;4.58]

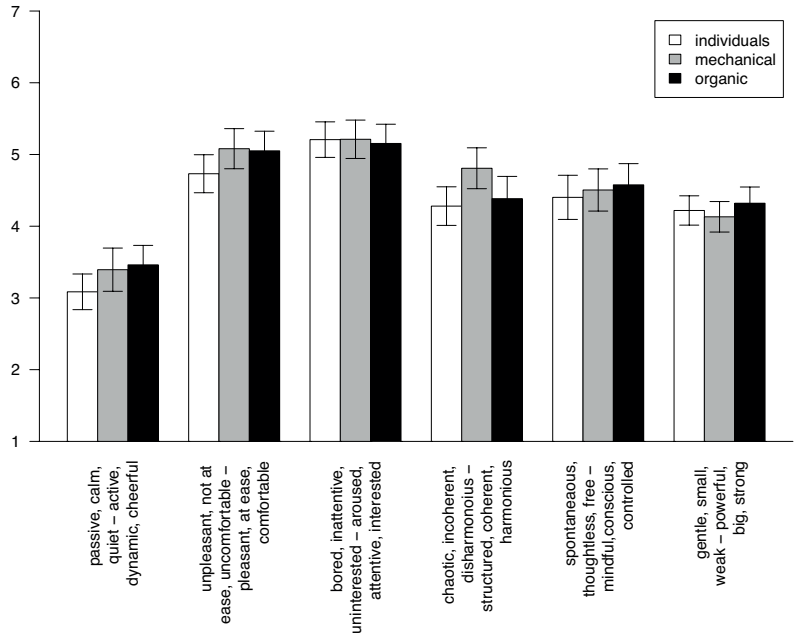


Figure 1. Experiment 1: Mean and 95% confidence interval from the participants' feelings per condition.

Table 3. *Experiment 1: Mean and 95 % confidence intervals from the impression of the dancers per condition.*

	Condition		
	Individuals ***M [95%CI]***	**Mechanical** ***M [95%CI]***	**Organic** ***M [95%CI]***
Passive, calm, quiet versus active, dynamic, cheerful.	4.83 [4.54;5.12]	4.42 [4.13;4.70]	5.22 [4.92;5.53]
Unpleasant, not at ease, uncomfortable versus pleasant, at ease, comfortable.	4.53 [4.21;4.85]	4.95 [4.66;5.25]	5.35 [5.02;5.67]
Bored, inattentive, uninterested versus aroused, attentive, interested.	5.45 [5.18;5.71]	5.50 [5.26;5.75]	5.67 [5.39;5.94]
Chaotic, incoherent, disharmonious versus structured, coherent, harmonious.	3.81 [3.40;4.22]	5.52 [5.25;5.80]	4.91 [4.54;5.28]
Spontaneous, thoughtless, free versus mindful, conscious, controlled.	4.96 [4.60;5.33]	5.72 [5.47;5.98]	4.64 [4.24;5.04]
Gentle, small, weak versus powerful, big, strong.	5.01 [4.74;5.28]	4.74 [4.49;4.99]	5.31 [5.04;5.57]

Table 4. *Experiment 1: Effect of Contract 1 and 2 on perceived entitativity and belonging, controlling for feelings of pleasantness, ease, and comfort and cultural behaviour.*

	Dependent variable:	
	Perceived entitativity	**Belonging**
Contrast 1	1.715***	0.410*
	$p < .001$	$p = .049$
	(1.31;2.12)	(0.01;0.81)
Contrast 2	0.021	0.132
	$p = .919$	$p = .531$
	(-0.43;0.48)	(-0.32;0.59)
Affect pleasantness	0.222***	0.347***
	$p < .001$	$p < .001$
	(0.11;0.34)	(0.23;0.46)
Cultural behaviour	0.080	0.126*
	$p = .174$	$p = .035$
	(-0.03;0.20)	(0.01;0.24)
Constant	3.566***	1.249**
	$p < .001$	$p = .001$
	(2.81;4.32)	(0.50;2.00)
Observations	260	260
Log Likelihood	-438.732	-439.239
Akaike Inf. Crit.	891.464	892.479
Bayesian Inf. Crit.	916.388	917.404

Note: regression coefficients of mulitlevel analysis, p-values and 95% confidence intervals are shown

Table 5. *Experiment 1: Effect of Contract 1 and 2 on perceived entitativity and belonging, controlling for appraisal of pleasantness, ease, and comfort and cultural behaviour.*

	Dependent variable:	
	Perceived entitativity	**Belonging**
Contrast 1	1.570***	0.387
	$p < .001$	$p = .066$
	(1.18;1.96)	(0.03;0.80)
Contrast 2	-0.151	0.001
	$p = .460$	$p = .998$
	(-0.59;0.29)	(-0.47;0.47)
Affect pleasantness	0.320***	0.222***
	$p < .001$	$p < .001$
	(0.21;0.43)	(0.11;0.33)
Cultural behaviour	0.054	0.102
	$p = .346$	$p = .095$
	(-0.06;0.17)	(-0.02;0.22)
Constant	3.211***	1.955***
	$p < .001$	$p < .001$
	(2.54;3.88)	(1.24;2.67)
Observations	261	261
Log Likelihood	-431.139	-448.028
Akaike Inf. Crit.	876.278	910.056
Bayesian Inf. Crit.	901.229	935.008

Note: regression coefficients of mulitlevel analysis, p-values and 95% confidence intervals are shown

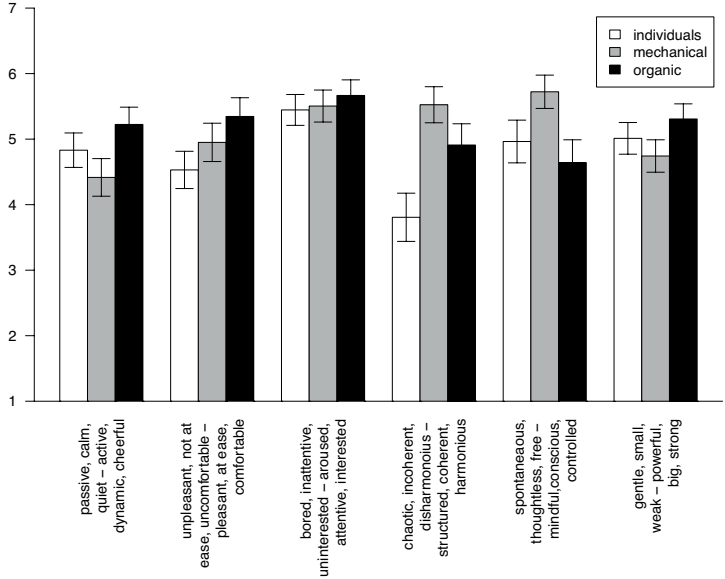


Figure 2. Experiment 1: Mean and 95% confidence interval from the participants' impression of the dancers per condition.

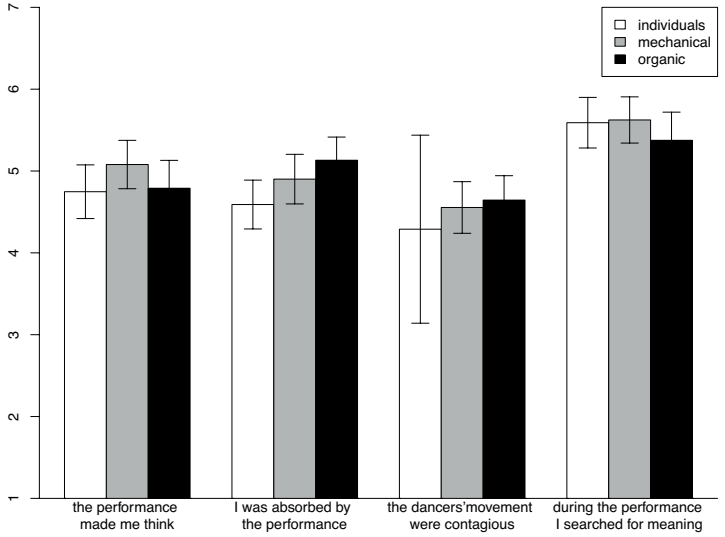


Figure 3. Experiment 1: Mean and 95% confidence interval from the participants' experience of the performance per condition.

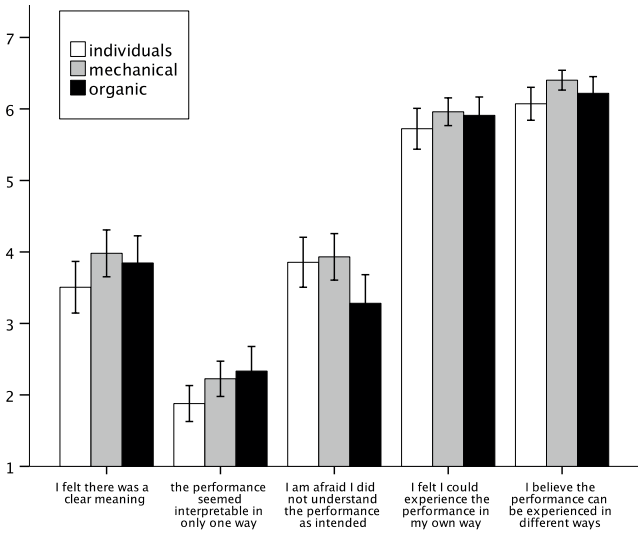


Figure 4. Experiment 1: Mean and 95% confidence interval from the participants' experience of the performance per condition.

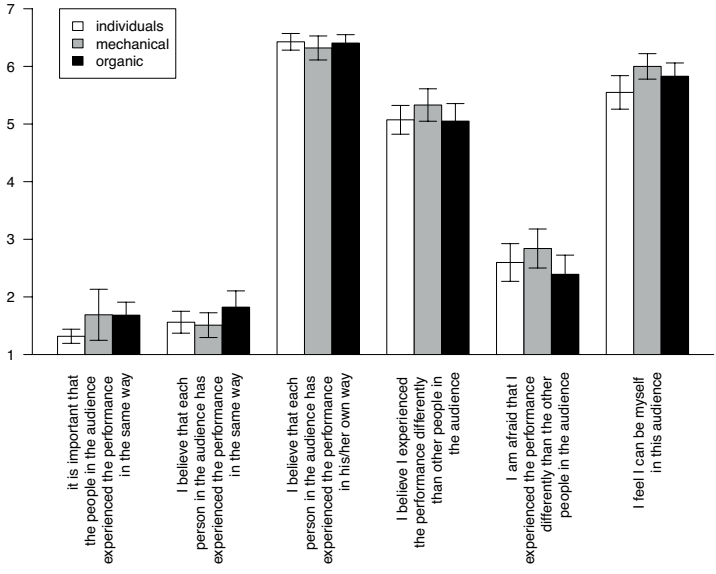


Figure 5. Experiment 1: Mean and 95% confidence interval from the participants' experience of the performance and the audience per condition.

Table 6. *Experiment 2: Correlations between measurements*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Perceived entitativity	__													
2. Perceived personal value	.245***	__												
3. Perceived similarity	.511***	.168**	__											
4. Perceived uniqueness	.063	.266***	-.005	__										
5. Attention to whole	.190***	.120*	.178**	-.124*	__									
6. Attention to individuals	-.124*	-.109*	-.092	.109*	-.549***	__								
7. Belonging with the dancers	.278***	.225***	.202***	.069	.096	-.119*	__							
8. Identification with the dancers	.153**	.261**	.040	.075	.100	-.066	.617***	__						
9. Closeness audience and dancers	.188***	.286***	.156**	.032	.217***	-.132*	.509***	.447***	__					
10. Evoked interest	.200***	.340***	.084	.077	.111*	-.100	.499***	.500***	.457***	__				
11. Positive evaluation	.339***	.369***	.210***	.044	.239***	-.141**	.555***	.456***	.471***	.669***	__			
12. Negative evaluation	-.309***	-.366***	-.180**	-.068	-.201***	.138**	-.541***	-.419***	-.417***	-.634***	-.886***	__		
13. Solidarity with the dancers [aggregated]	.254***	.264***	.153**	.080	.107*	-.108*	.939***	.850***	.535***	.553***	.570***	-.544***	__	
14. Artistic evaluation [aggregated]	.292***	.396***	.160**	.074	.192***	-.133*	.583***	.521***	.502***	.911***	.898***	-.881***	.618***	__

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 7. *Experiment 2: Mean and standard deviation for perception of the target group per condition*

	Condition		
	Individuals ***M (SD)***	**Mechanical** ***M (SD)***	**Organic** ***M (SD)***
Perceived similarity	4.90 (1.63)	4.99 (1.29)	4.93 (1.46)
Perceived uniqueness	5.66 (1.29)	5.19 (1.52)	5.43 (1.45)
Attention to whole	3.44 (1.71)	3.96 (1.57)	4.18 (1.57)
Attention to individuals	5.02 (1.59)	4.63 (1.62)	4.03 (1.56)

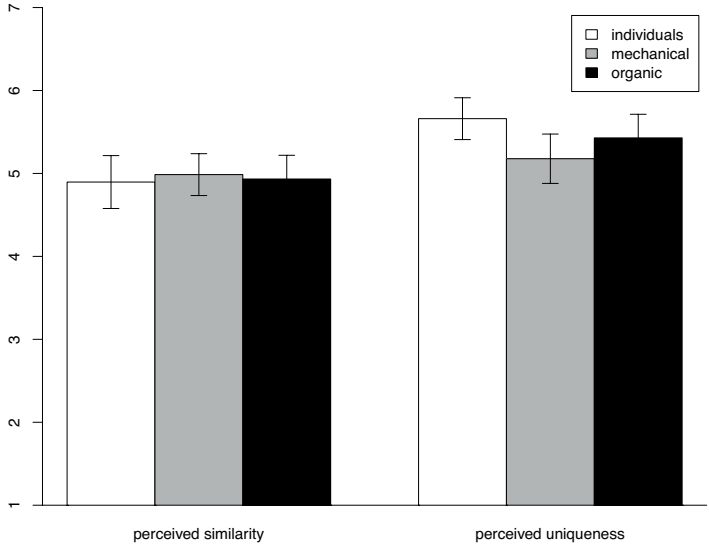


Figure 6. Experiment 2a: Mean and 95% confidence interval for perception of the target group per condition.

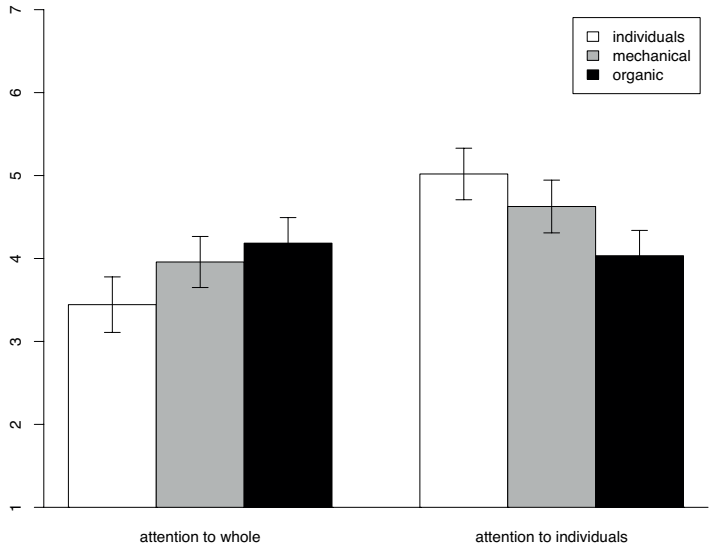


Figure 7. Experiment 2a: Mean and 95% confidence interval for attention per condition.

Table 8. *Experiment 1: Number and percentage of participants who subscribed to the newsletter per condition.*

	Condition		
	Individuals ***N(%)***	**Mechanical** ***N(%)***	**Organic** ***N(%)***
Yes	9 (10.98%)	26 (26.53%)	17 (22.08%)
No	61 (74.39%)	64 (65.31%)	49 (63.64%)
Already subscribed	12 (14.63%)	8 (8.16%)	11 (14.29%)
Total	82 (100%)	98 (100%)	77 (100%)

Table 9. *Experiment 2a: Mean and standard deviation for relationship with individual dancers per condition.*

	Condition					
	Individuals		**Mechanical**		**Organic**	
	M	***(SD)***	***M***	***(SD)***	***M***	***(SD)***
Connection with dancer 1	2.74	(1.84)	2.99	(1.51)	3.23	(1.61)
Connection with dancer 2	3.46	(1.68)	4.12	(1.48)	3.73	(1.71)
Connection with dancer 3	4.34	(1.89)	5.23	(1.41)	4.56	(1.72)
Connection with dancer 4	3.38	(1.81)	4.36	(1.49)	3.98	(1.55)

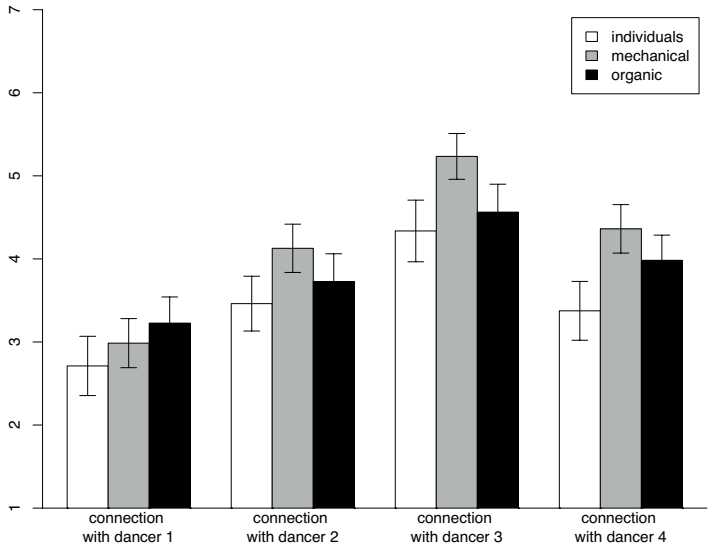


Figure 8. Experiment 1: Mean and 95% confidence interval from the participants' connection with each dancer per condition.

Table 10. *Experiment 2a: Number and percentage of participants who subscribed to the newsletter per condition*

	Condition		
	Individuals ***N(%)***	**Mechanical** ***N(%)***	**Organic** ***N(%)***
No	66 (66.67%)	94 (66.67%)	76 (67.26%)
Yes	23 (23.23%)	27 (19.15%)	27 (23.89%)
Already subscribed	10 (10.10%)	20 (14.18%)	10 (8.85%)
Total	99 (100%)	141 (100%)	113 (100%)

Table 11. *Experiment 2b: Mean and standard deviation for solidarity among the audience (after task) per condition*

	Condition					
	Individuals		Mechanical		Organic	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Entitativity	4.43	(1.50)	4.45	(1.37)	4.52	(1.39)
Uniqueness	3.81	(1.71)	3.60	(1.78)	3.61	(1.82)
Personal value	3.43	(1.66)	3.11	(1.66)	3.22	(1.69)
Belonging	4.68	(1.29)	4.76	(1.23)	4.76	(1.39)
Identification	3.80	(1.59)	4.05	(1.53)	4.06	(1.65)
Similarity	3.35	(1.59)	3.48	(1.42)	3.60	(1.57)

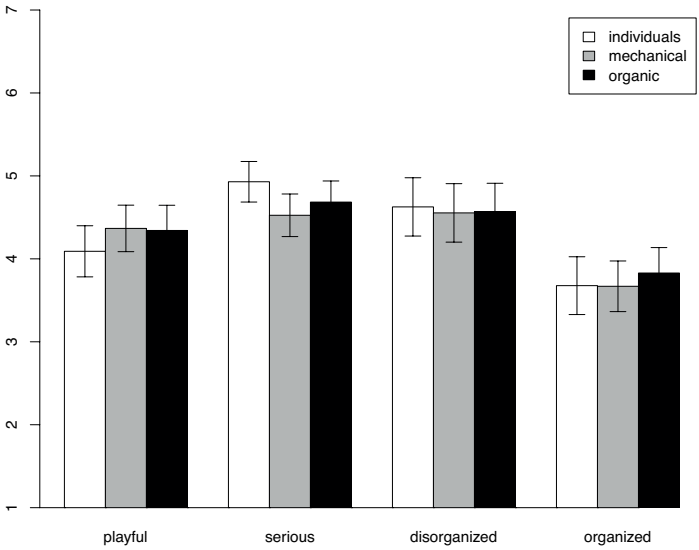


Figure 9. Experiment 2b: Mean and 95% confidence interval from the participants' appraisal of the task per condition.

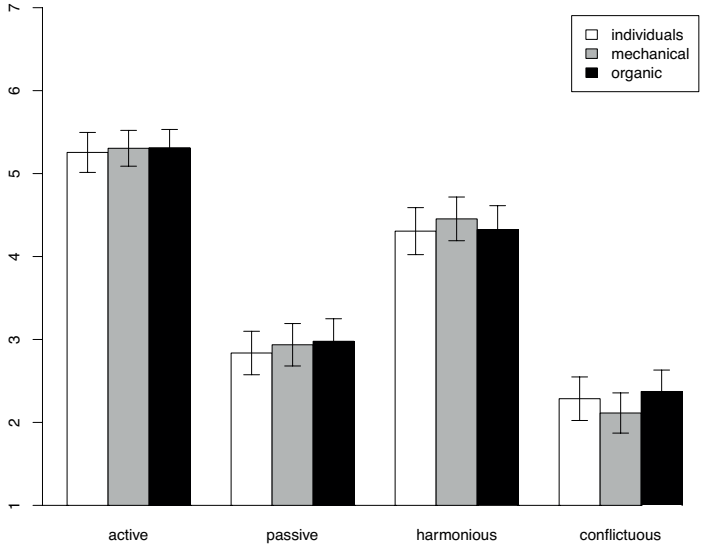


Figure 10. Experiment 2b: Mean and 95% confidence interval from the participants' appraisal of the task per condition.

Table 12. *Experiment 2a: Mean and standard deviation per condition for the number of words used in the answer to the open question about feelings evoked by the performance*

	Condition					
	Individuals		Mechanical		Organic	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Positive	0.61	(0.76)	1.17	(0.94)	0.99	(0.95)
Negative	1.62	(1.00)	1.12	(1.05)	0.83	(1.05)
Arousal	1.95	(1.17)	2.00	(1.30)	1.58	(1.25)
Non-arousal	0.09	(0.38)	0.12	(0.33)	0.17	(0.42)
Structure	0.01	(0.10)	0.15	(0.41)	0.07	(0.26)
Chaos	0.30	(0.52)	0.19	(0.48)	0.11	(0.34)
Social	0.19	(0.39)	0.44	(0.70)	0.59	(0.84)
Unsocial	0.48	(0.65)	0.37	(0.58)	0.34	(0.66)

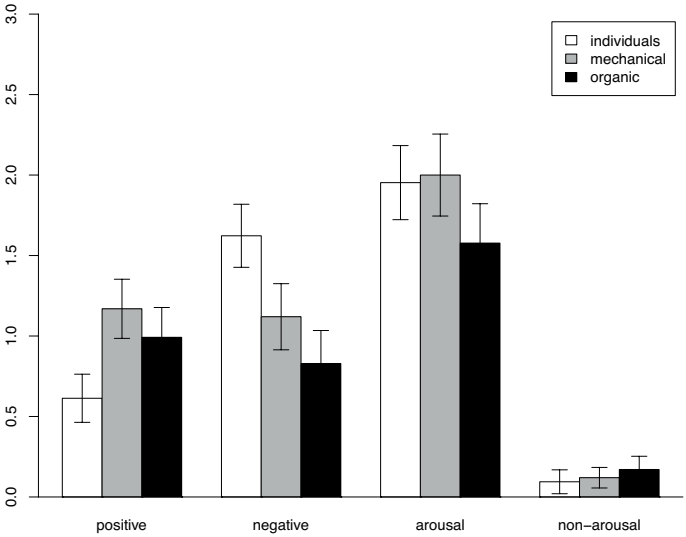


Figure 11a. Experiment 2a: Mean and 95% confidence interval per condition for the number of words used in the answer to the open question about feelings evoked by the performance.

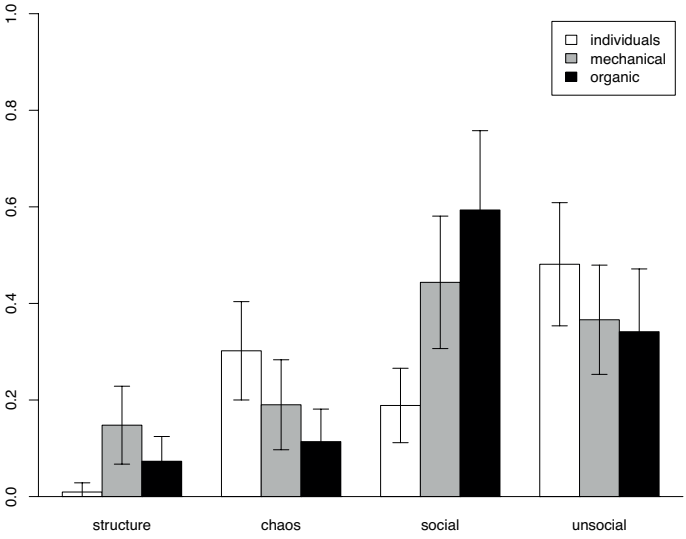


Figure 11b. Experiment 2a: Mean and 95% confidence interval per condition for the number of words used in the answer to the open question about feelings evoked by the performance

Table 13. *Experiment 2b: Mean and standard deviation per condition for the number of words used in the answer to the open question about mood of the group during the beginning and the end of the task*

	Condition											
	Individuals				Mechanical				Organic			
	Beginning		End		Beginning		End		Beginning		End	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Positive	0.69	(0.81)	0.90	(0.88)	0.80	(0.81)	1.06	(0.91)	0.80	(0.87)	0.96	(0.92)
Negative	0.41	(0.64)	0.42	(0.62)	0.30	(0.54)	0.32	(0.55)	0.26	(0.51)	0.28	(0.53)
Arousal	1.05	(0.95)	1.08	(0.91)	1.15	(0.97)	1.18	(0.99)	1.15	(0.92)	1.04	(0.86)
Non-arousal	0.38	(0.56)	0.20	(0.42)	0.45	(0.57)	0.15	(0.36)	0.34	(0.56)	0.14	(0.37)
Structure	0.07	(0.29)	0.05	(0.21)	0.12	(0.35)	0.13	(0.33)	0.13	(0.40)	0.04	(0.20)
Chaos	0.17	(0.49)	0.20	(0.49)	0.17	(0.45)	0.15	(0.39)	0.11	(0.34)	0.08	(0.27)
Social	0.25	(0.57)	0.28	(0.55)	0.27	(0.53)	0.39	(0.64)	0.33	(0.54)	0.36	(0.59)
Unsocial	0.04	(0.19)	0.04	(0.19)	0.05	(0.22)	0.04	(0.18)	0.06	(0.23)	0.06	(0.23)

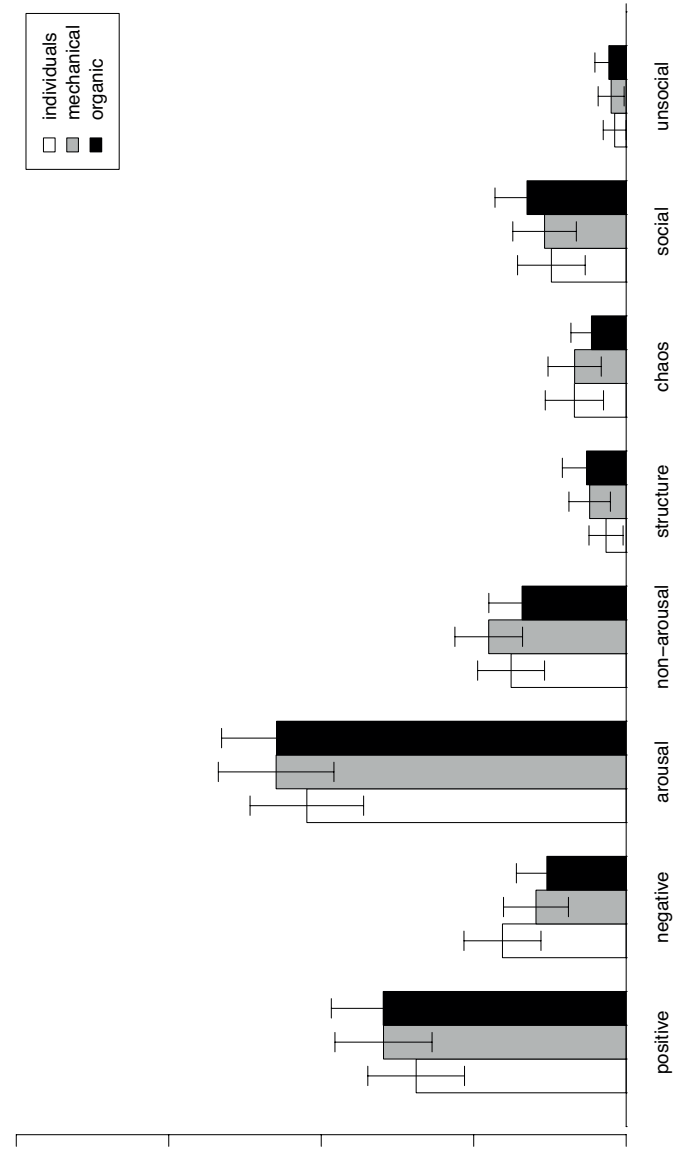


Figure 12a. Mean and 95% confidence interval per condition for the number of words used in the answer to the open question about mood of the group during the beginning of the task.

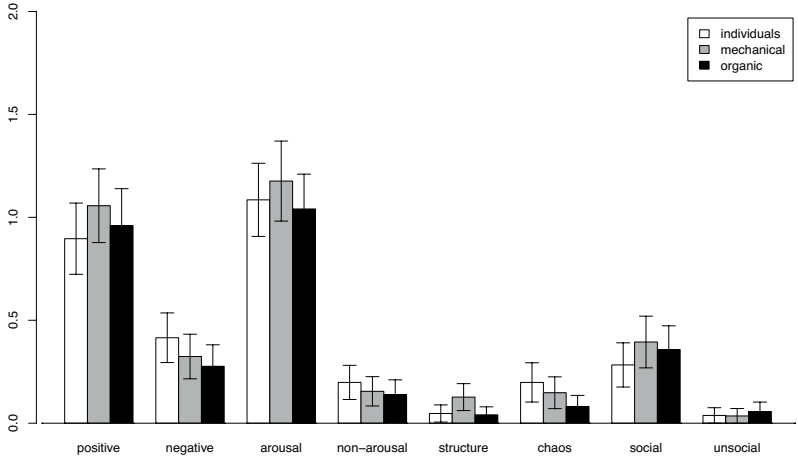


Figure 12b. Mean and 95% confidence interval per condition for the number of words used in the answer to the open question about mood of the group during the end of the task.

Table 14. *Experiment 3: Correlations between measurements*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Perceived entitativity	__										
2. Perceived personal value	.207*	__									
3. Dancers were directed	.183*	.123	__								
4. Solidarity with the dancers	.208*	.280**	-.087	__							
5. Solidarity among the audience	-.122	.150	-.045	-.038	__						
6. Evaluation of the performance	.283**	.472***	.184*	.561***	.026	__					
7. Evoked interest	.146	.362***	-.006	.709***	-.034	.742***	__				
8. Artistic evaluation [aggregated]	.223**	.441***	.086	.687***	-.007	.920***	.946***	__			
9. I felt unpleasant, not at ease, uncomfortable - pleasant, at ease, comfortable	.205*	.247**	.007	.455***	-.078	.562***	.544***	.592***	__		
10. The dancers were unpleasant, not at ease, uncomfortable - pleasant, at ease, comfortable	.364***	.162	.104	.296***	-.059	.374***	.306***	.361***	.417***	__	
11. The performance was unpleasant - pleasant	.285***	.233**	.012	.489***	.063	.584***	.590***	.629***	.694***	.549***	__

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 15. *Experiment 3: Mean and standard deviation from the participants' feelings per condition.*

	Condition					
	Individuals		Mechanical		Organic	
I felt…	***M***	***(SD)***	***M***	***(SD)***	***M***	***(SD)***
...passive, calm, quiet - ...active, dynamic, cheerful	2.98	(1.34)	3.17	(1.35)	2.89	(1.55)
...bored, inattentive, uninterested - ...aroused, attentive, interested	4.19	(1.61)	4.13	(1.48)	4.72	(1.33)
...chaotic, incoherent - ...structured, coherent	2.72	(1.41)	3.38	(1.48)	3.35	(1.48)
...disharmonious, discoordinated, unbalanced - ...harmonious, coordinated, balanced	2.81	(1.38)	3.67	(1.41)	4.37	(1.79)
...spontaneous, thoughtless, free - ...mindful, conscious, controlled	3.96	(1.65)	3.85	(1.64)	4.41	(1.67)
...gentle, small, sensitive - ...powerful, big, strong.	3.74	(1.47)	3.73	(0.89)	3.63	(1.18)

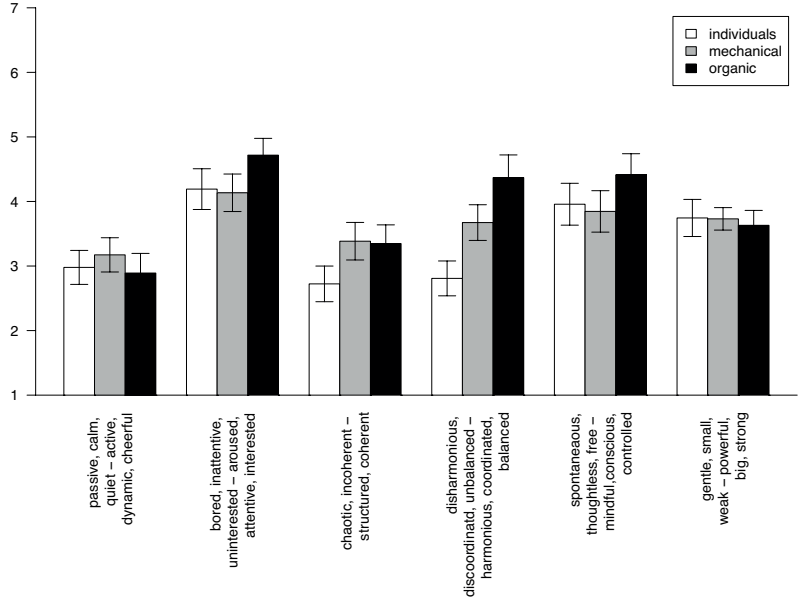


Figure 13. Experiment 3: Mean and 95% confidence interval from the participants' feelings per condition.

Table 16. *Experiment 3: Mean and standard deviation from the impression of the dancers per condition.*

	Condition					
	Individuals		Mechanical		Organic	
The dancers were…	***M***	***(SD)***	***M***	***(SD)***	***M***	***(SD)***
...passive, calm, quiet - ...active, dynamic, cheerful	5.40	(1.45)	5.56	(1.39)	4.74	(1.78)
...unpleasant, not at ease, uncomfortable - ...pleasant, at ease, comfortable	3.13	(1.92)	4.21	(1.75)	4.67	(1.59)
...bored, inattentive, uninterested - ...aroused, attentive, interested	5.89	(1.37)	6.12	(0.98)	6.07	(0.98)
...chaotic, incoherent - ...structured, coherent	3.23	(2.01)	3.98	(1.65)	4.89	(1.92)
...disharmonious, discoordinated, unbalanced - ...harmonious, coordinated, balanced	3.43	(2.00)	4.71	(1.27)	5.74	(1.42)
...spontaneous, thoughtless, free - ...mindful, conscious, controlled	3.62	(2.05)	3.92	(1.85)	4.78	(1.79)
...gentle, small, sensitive - ...powerful, big, strong.	5.43	(1.31)	5.25	(1.43)	4.43	(1.54)

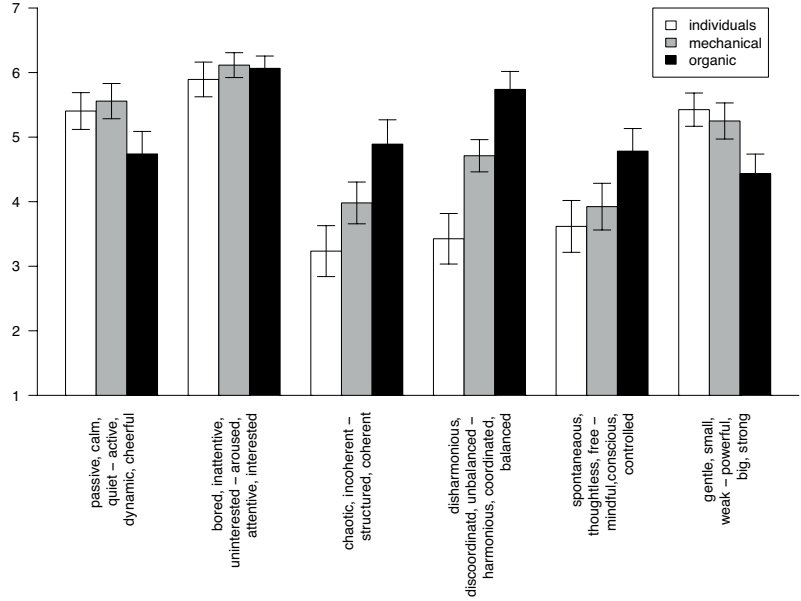


Figure 14. Experiment 3: Mean and 95% confidence interval from the participants' impression of the dancers per condition.

Table 17. *Experiment 3: Mean and standard deviation for relationship with individual dancers per condition.*

	Condition					
	Individuals		Mechanical		Organic	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Connection with dancer 1	2.06	(1.47)	2.19	(1.22)	3.24	(1.49)
Connection with dancer 2	2.68	(1.62)	3.08	(1.53)	4.00	(1.59)
Connection with dancer 3	3.06	(1.80)	4.37	(1.75)	4.52	(1.50)
Connection with dancer 4	2.40	(1.91)	3.50	(1.80)	3.74	(1.64)

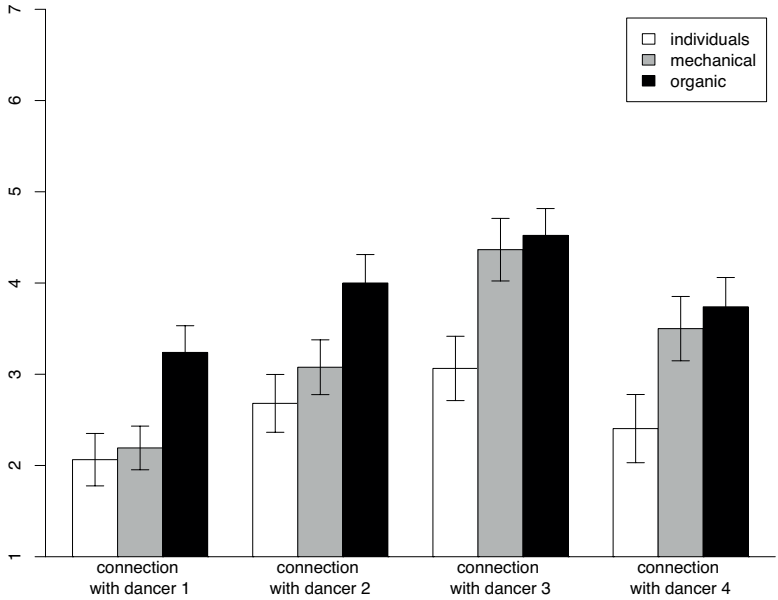


Figure 15. Experiment 3: Mean and 95% confidence interval from the participants' connection with each dancer per condition.

Table 18. *Experiment 3: Mean and standard deviation per condition for the separate items of evaluation of the performance.*

	Condition					
	Individuals		Mechanical		Organic	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
I thought the performance was well executed.	4.77	(1.63)	4.90	(1.33)	6.02	(0.88)
I enjoyed watching the performance.	3.15	(1.91)	4.23	(1.79)	5.02	(1.71)
I thought the movements of the dancers looked professional	4.36	(1.88)	4.40	(1.65)	5.63	(1.02)

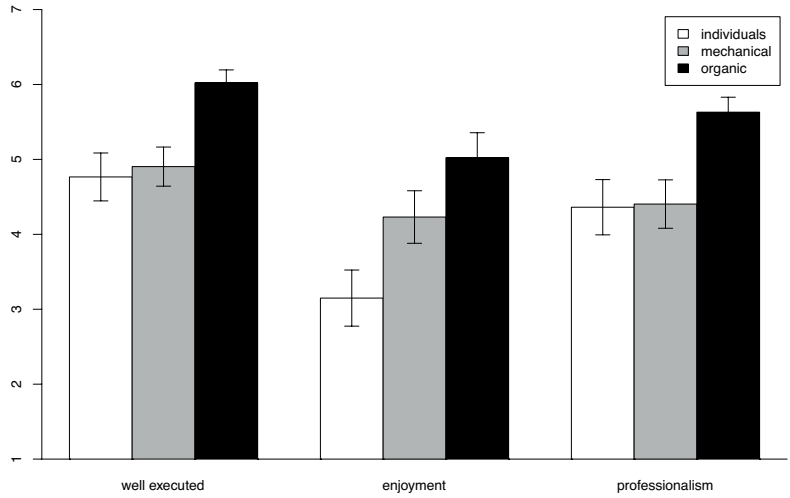


Figure 16. Experiment 3: Mean and 95% confidence interval from the participants' evaluation of the performance per condition.

Table 19. *Experiment 3: Mean and standard deviation for the attitude towards the performance per condition.*

	Condition					
	Individuals		Mechanical		Organic	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Bad:Good	4.70	(1.63)	4.65	(1.33)	5.67	(1.08)
Ugly:Beautiful	2.89	(1.49)	4.23	(1.25)	5.02	(1.54)
Sad:Happy	2.72	(1.10)	3.38	(1.17)	3.30	(1.05)
Unpleasant:Pleasant	2.66	(1.42)	3.79	(1.46)	4.46	(1.56)

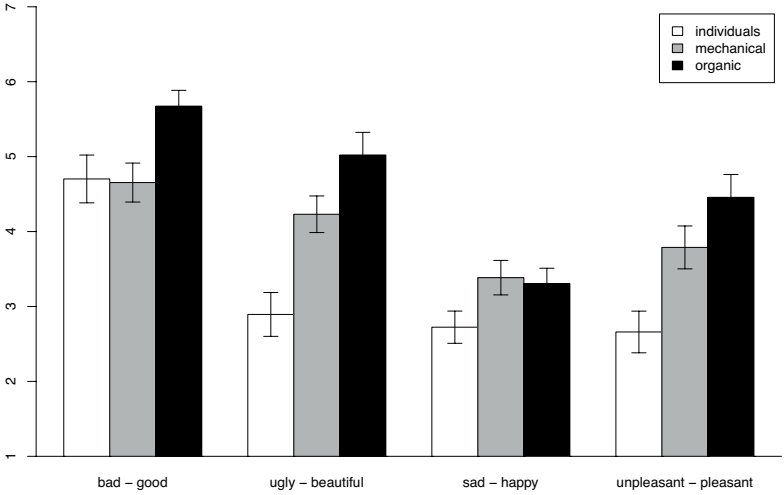


Figure 17. Experiment 3: Mean and 95% confidence interval from the participants' attitude towards the performance per condition.

Chapter 3

Manipulation Instructions Experiment 1

Control condition

"You will now listen to a song and imagine playing an instrument in that song. First the experimenter will play a fragment of the song to get familiar with the song. Then the experimenter is going to play the whole song. This time think about playing an instrument in the song (just imagine it without actually making the movements you would make if you would play that instrument). Make sure to pay attention to the rhythm. Before starting please take position as marked on the floor ('1'). After starting the song the experimenter is going to leave the room and you can start your task. During the task please don't talk to the other participants."

Observers – mechanical and organic condition

"You will now observe some of the other participants perform a song with "air-instruments" (these are imaginary instruments). One other participant will be the audience, just like you. First the experimenter will play a fragment of the song to get familiar with the song. Then the experimenter is going to play the full song. This time the other participants are going to perform the song on "air-instruments". Before starting please take your position as marked on the floor ('1'). Pay careful attention. You will have to answer some questions about it later. After starting the song the experimenter will leave the room."

Actors – mechanical condition

"Together with other participants you will now play air-guitar. This means you are going to pretend to play the guitar to the song you are going to hear. You will first hear a fragment of the song to get familiar with the song. Then, the experimenter will play the full song. This time we want you to perform on 'air-guitars' together with some of the other participants. Because a performance requires an audience, participant 1 and 2 will not join the airband. They are your audience. Just make sure you stay in rhythm with the song while playing. Before starting, please take your position as marked on the floor (the '3'). After starting the song, the experimenter will leave the room and you can start your performance."

Actors - organic condition

"Together with other participants you will now form an airband. This means pretending to play an instrument to the song you are going to hear. You will first hear a fragment of the song to get familiar with the song. Then, the experimenter will play the full song. This time we want you to perform in an airband together with some of the other participants. Because a performance requires an audience, participant 1 and 2 will not join the airband. They are your audience. Each of the airband members can choose a different 'imaginary' instrument to play. Note that this 'imaginary' instrument does not necessarily have to be an instrument used in the actual song. It can be any instrument you like, as long as you do not choose the same instrument as one of the other airband members. Just make sure you keep in rhythm with the song while playing. Before starting, please take your position as marked on the floor (the '3'). After starting the song, the experimenter will leave the room and you can start your performance."

Manipulation Instructions Experiment 2

Observers – all conditions

"You will now observe some of the other participants perform a song with air-instruments (these are imaginary instruments). You and participants 2,3, and 4 will be the audience. You will first hear a fragment of the song to get familiar with the song. Then, you will hear the full song. This time the other participants will perform the song with 'air-instruments'. Before starting, please take your position as marked on the floor ('1'). After starting the song the instructor will leave the room."

Actors – control condition

"We would like you to play air-instruments. This means pretending to play an instrument while listening to a song. You will first hear a fragment of the song to get familiar with the song. Then, you will hear the full song. This time we want you to perform on 'air-instruments'. Some of the other participants (participant 6, 7, and 8) will do the same. Because a performance requires an audience, participant 1, 2, 3, and 4 will not join the performance. They are your audience. You can choose any imaginary instrument you want to play. Note that this

imaginary instrument does not necessarily have to be an instrument used in the actual song. It can be any instrument you like. Remember, there is no right or wrong way of doing it, just make sure you stay in rhythm with the song and have fun! Before starting, please take your position as marked on the floor (the '5'). After starting the song, the instructor will leave the room and you can start your performance."

Actors – mechanical condition

"We would like you to, together with other participants, play air-guitar. This means pretending to play the guitar while listening to a song. You will first hear a fragment of the song to get familiar with the song. Then, you will hear the full song. This time we want you to perform on 'air-guitars' together with some of the other participants (participant 6, 7, and 8). Because a performance requires an audience, participant 1, 2, 3, and 4 will not join the performance. They are your audience. Remember, there is no right or wrong way of doing it, just make sure you stay in rhythm with the song and have fun! Before starting, please take your position as marked on the floor (the '5'). After starting the song, the instructor will leave the room and you can start your performance."

Actors – organic condition

"We would like you to, together with other participants, play air instruments. This means pretending to play an instrument while listening to a song. You will first hear a fragment of the song to get familiar with the song. Then, you will hear the full song. This time we want you to perform on 'air instruments' together with some of the other participants (participant 6, 7, and 8). Because a performance requires an audience, participant 1, 2, 3, and 4 will not join the performance. They are your audience. Each of the performing participants can choose a different imaginary instrument to play. Note that this imaginary instrument does not necessarily have to be an instrument used in the actual song. It can be any instrument you like, as long as you do not choose the same instrument as the other participants. Remember, there is no right or wrong way of doing it, just make sure you stay in rhythm with the song and have fun! Before starting, please take your position as marked on the floor (the '5'). After starting the song, the instructor will leave the room and you can start your performance."

Correlations between dependent variables Experiment 1

Table 1. Correlations between the dependent variables (Experiment 1).

	1.	2.	3.	4.	5.
1. Belonging	—				
2. Identification	.548***	—			
3. Solidarity (aggr.)	.814***	.932***	—		
4. Personal value	.309***	.495***	.478***	—	
5. Entitativity	.757***	.765***	.833***	.438***	—
6. Perceived entitativity	.122	.355*	.299*	.052	—

*Note: *p<.05; **p<.01; ***p<.001*

Output of all analyses Experiment 1

Hlavac, Marek (2015). stargazer: Well-Formatted Regression and Summary Statistics Tables. R package version 5.2. http://CRAN.R-project.org/package=stargazer

Table 2. Output multilevel regression for identification, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Identification	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	0.600***, $p < .001$, (0.341; 0.860)	0.672***, $p < .001$, (0.427; 0.917)
Contrast 2 (Organic vs. Mechanical)	-0.124, $p = 0.421$, (-0.421; 0.174)	-0.053, $p = 0.716$, (-0.333; 0.227)
Role	0.010, $p = 0.928$, (-0.203; 0.222)	0.063, $p = 0.586$, (-0.162; 0.287)
Acquaintance		0.338*, $p = 0.022$, (0.054; 0.623)
Comfort		0.057*, $p = 0.046$, (0.002; 0.112)
Effort		0.042, $p = 0.108$, (-0.009; 0.093)
Difficulty		-0.0003, $p = 0.990$, (-0.053; 0.053)
Constant	4.010***, $p < .001$, (3.638; 4.382)	3.227***, $p < .001$, (2.635; 3.820)
Observations	191	188
Log Likelihood	-210.514	-200.670
Akaike Inf. Crit.	433.028	421.339
Bayesian Inf. Crit.	452.542	453.704

Note: $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$

Table 2a. Output multilevel regression for identification for actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Identification	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.653***, $p < .001$, (0.348; 0.958)	0.670***, $p < .001$, (0.378; 0.962)
Contrast 2 (Organic vs. Mechanical)	-0.221, $p = 0.224$, (-0.571; 0.129)	-0.120, $p = 0.490$, (-0.455; 0.216)
Acquaintance		0.199, $p = 0.280$, (-0.159; 0.556)
Comfort		0.043, $p = 0.269$, (-0.033; 0.119)
Effort		0.098*, $p = 0.026$, (0.014; 0.182)
Difficulty		-0.045, $p = 0.213$, (-0.116; 0.025)
Constant	4.028***, $p < .001$, (3.885; 4.172)	3.316***, $p < .001$, (2.755; 3.877)
Observations	125	124
Log Likelihood	-144.806	-136.327
Akaike Inf. Crit.	299.612	290.654
Bayesian Inf. Crit.	313.753	316.036

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 2b. Output multilevel regression for identification for observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Identification	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.500*, $p = 0.012$, (0.134; 0.866)	0.580**, $p = 0.005$, (0.208; 0.952)
Contrast 2 (Organic vs. Mechanical)	0.048, $p = .824$, (-0.368; 0.464)	0.136, $p = 0.502$, (-0.256; 0.527)
Acquaintance		0.633*, $p = 0.011$, (0.189; 1.078)
Comfort		0.028, $p = 0.545$, (-0.060; 0.115)
Effort		-0.001, $p = 0.965$, (-0.063; 0.061)
Difficulty		0.030, $p = 0.476$, (-0.050; 0.109)
Constant	4.015***, $p < .001$, (3.844; 4.186)	3.589***, $p < .001$, (2.765; 4.413)
Observations	66	64
Log Likelihood	-64.315	-57.949
Akaike Inf. Crit.	138.630	133.898
Bayesian Inf. Crit.	149.578	153.328

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 3. Output multilevel regression for belonging, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Belonging	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	-0.506, $p = 0.314$, (-1.476; 0.463)	-0.100, $p = 0.836$, (-1.032; 0.833)
Contrast 2 (Organic vs. Mechanical)	-0.908, $p = 0.116$, (-2.008; 0.193)	-0.811, $p = 0.135$, (-1.849; 0.226)
Role	0.537***, $p = 0.0001$, (0.279; 0.794)	0.723***, $p < .0001$, (0.467; 0.979)
Acquaintance		0.398*, $p = 0.018$, (0.073; 0.722)
Comfort		0.111***, $p = 0.001$, (0.049; 0.174)
Effort		0.085**, $p = 0.006$, (0.026; 0.144)
Difficulty		-0.064*, $p = 0.040$, (-0.124; -0.004)
Contrast 1*Role	0.641*, $p = 0.024$, (0.091; 1.192)	0.471, $p = 0.085$, (-0.061; 1.004)
Contrast 2*Role	0.382, $p = 0.234$, (-0.244; 1.008)	0.388, $p = 0.205$, (-0.208; 0.983)
Constant	3.201***, $p < .001$, (2.748; 3.654)	1.816***, $p < .0001$, (1.141; 2.491)
Observations	191	188
Log Likelihood	-246.917	-223.516
Akaike Inf. Crit.	509.834	471.032
Bayesian Inf. Crit.	535.852	509.869

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 3a. Output multilevel regression for belonging for actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Belonging	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	0.779***, $p = 0.0001$, (0.451; 1.107)	0.810***, $p = 0.00001$, (0.515; 1.106)
Contrast 2 (Organic vs. Mechanical)	-0.156, $p = 0.424$, (-0.532; 0.221)	-0.049, $p = 0.781$, (-0.389; 0.291)
Acquaintance		0.250, $p = 0.185$, (-0.117; 0.617)
Comfort		0.066, $p = 0.100$, (-0.012; 0.144)
Effort		0.100*, $p = 0.026$, (0.014; 0.187)
Difficulty		-0.088*, $p = 0.021$, (-0.161; -0.015)
Constant	4.273***, $p < .001$, (4.119; 4.427)	3.577***, $p < .001$, (3.001; 4.154)
Observations	125	124
Log Likelihood	-152.710	-139.798
Akaike Inf. Crit.	315.420	297.596
Bayesian Inf. Crit.	329.562	322.979

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 3b. Output multilevel regression for belonging for observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Belonging	
	(1)	(2)
Contrast 1 (Experimental Vs. Control)	0.113, *p* = 0.720, (-0.499; 0.725)	0.557*, *p* = 0.042, (0.042; 1.072)
Contrast 2 (Organic Vs. Mechanical)	-0.493, *p* = 0.176, (-1.191; 0.205)	-0.434, *p* = 0.126, (-0.975; 0.107)
Acquaintance		0.685*, *p* = 0.041, (0.066; 1.304)
Comfort		0.227**, *p* = 0.002, (0.104; 0.349)
Effort		0.104*, *p* = 0.027, (0.018; 0.191)
Difficulty		-0.007, *p* = 0.902, (-0.119; 0.105)
Constant	3.708***, *p* = 0.000, (3.422; 3.995)	1.391*, *p* = 0.024, (0.244; 2.538)
Observations	66	64
Log Likelihood	-92.827	-79.402
Akaike Inf. Crit.	195.655	176.803
Bayesian Inf. Crit.	206.603	196.233

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 4. Output multilevel regression for personal value, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Personal value	
	(1)	(2)
Contrast 1 (Experimental Vs. Control)	-0.647, *p* = 0.290, (-1.827; 0.532)	-0.380, *p* = 0.547, (-1.602; 0.843)
Contrast 2 (Organic Vs. Mechanical)	-1.141, *p* = .105, (-2.480; 0.197)	-1.116, *p* = .118, (-2.474; 0.243)
Role	0.363*, *p* = .026, (0.047; 0.679)	0.381*, *p* = .028, (0.045; 0.716)
Acquaintance		0.291, *p* = .183, (-0.135; 0.717)
Comfort		0.054, *p* = .200, (-0.028; 0.137)
Effort		0.051, *p* = .201, (-0.027; 0.129)
Difficulty		0.060, *p* = .139, (-0.019; 0.139)
Contrast 1*Role	0.674, *p* = .053, (-0.002; 1.349)	0.565, *p* = .114, (-0.131; 1.262)
Contrast 2*Role	0.810*, *p* = .041, (0.041; 1.578)	0.817*, *p* = .042, (0.038; 1.596)
Constant	2.297***, *p* < .001, (1.745; 2.848)	1.314**, *p* = .005, (0.429; 2.199)
Observations	191	188
Log Likelihood	-283.257	-274.502
Akaike Inf. Crit.	582.514	573.003
Bayesian Inf. Crit.	608.533	611.840

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 4a. Output multilevel regression for personal value for actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Personal value	
	(1)	**(2)**
Contrast 1 (Experimental Vs. Control)	0.712**, *p* = .007, (0.234; 1.191)	0.751**, *p* = .004, (0.285; 1.217)
Contrast 2 (Organic Vs. Mechanical)	0.479, *p* = .098, (-0.071; 1.029)	0.574*, *p* = .045, (0.037; 1.112)
Acquaintance		0.324, *p* = .237, (-0.209; 0.857)
Comfort		0.065, *p* = .261, (-0.047; 0.177)
Effort		0.091, *p* = .161, (-0.035; 0.216)
Difficulty		-0.019, *p* = .716, (-0.123; 0.084)
Constant	3.024***, *p* < .001, (2.799; 3.249)	2.091***, *p* < .001, (1.262; 2.921)
Observations	125	124
Log Likelihood	-190.667	-185.101
Akaike Inf. Crit.	391.334	388.202
Bayesian Inf. Crit.	405.476	413.585

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 4b. Output multilevel regression for personal value for observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Personal value	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.027, *p* = .920, (-0.488; 0.541)	0.139, *p* = .620, (-0.406; 0.684)
Contrast 2 (Organic vs. Mechanical)	-0.310, *p* = .305, (-0.893; 0.273)	-0.310, *p* = .297, (-0.882; 0.263)
acquaintance		0.060, *p* = .859, (-0.595; 0.715)
comfort		0.005, *p* = .940, (-0.124; 0.135)
effort		0.021, *p* = .662, (-0.071; 0.112)
difficulty		0.173**, *p* = .009, (0.055; 0.291)
constant	2.653***, *p* < .001, (2.413; 2.893)	1.935**, *p* = .004, (0.722; 3.148)
Observations	66	64
Log Likelihood	-91.528	-83.022
Akaike Inf. Crit.	193.056	184.044
Bayesian Inf. Crit.	204.005	203.474

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 5. Output multilevel regression for entitativity among actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported. Note that entitativity among actors was only measured for the experimental conditions.

	Entitativity actors	
	(1)	**(2)**
Condition (Organic vs. Mechanical)	-0.114, $p = .687$, (-0.662; 0.433)	0.111, $p = .635$, (-0.338; 0.560)
Acquaintance		0.0003, $p = 1.000$, (-0.551; 0.551)
Comfort		0.123, $p = .059$, (-0.002; 0.248)
Effort		0.221**, $p = .005$, (0.076; 0.367)
Difficulty		-0.223***, $p = .001$, (-0.345; -0.100)
Constant	4.526***, $p < .001$, (3.649; 5.402)	3.036***, $p < .001$, (1.793; 4.280)
Observations	83	82
Log Likelihood	-132.713	-113.787
Akaike Inf. Crit.	273.427	243.573
Bayesian Inf. Crit.	283.102	262.827

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 6. Output multilevel regression for observers' perceived entitativity among actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported. Note that perceived entitativity was only measured for the experimental conditions.

	Perceived entitativity	
	(1)	**(2)**
Condition (Organic vs. Mechanical)	0.255, $p = .379$, (-0.301; 0.811)	0.341, $p = .316$, (-0.310; 0.992)
Acquaintance		0.606, $p = .231$, (-0.345; 1.557)
Comfort		0.056, $p = .499$, (-0.102; 0.213)
Effort		-0.012, $p = .812$, (-0.113; 0.088)
Difficult		0.055, $p = .472$, (-0.091; 0.201)
Constant	3.620***, $p < .001$, (2.711; 4.528)	2.831**, $p = .003$, (1.215; 4.447)
Observations	45	43
Log Likelihood	-60.315	-55.144
Akaike Inf. Crit.	128.630	126.288
Bayesian Inf. Crit.	135.857	140.378

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Correlations between dependent variables Experiment 2

Table 7. Correlations between the dependent variables (Experiment 2).

	1.	2.	3.	4.	5.	6.	7.	8.
1. Belonging	__							
2. Identification	.482***	__						
3. Personal value	.091	.269***	__					
4. Solidarity (aggr.)	.881***	.839***	.202**	__				
5. Arousal	.312***	.284***	.273***	.347***	__			
6. Entitativity	.581***	.559***	.345***	.655***	.355***	__		
7. Engagement actors	.421***	.338***	.181**	.444***	.558***	.432***	__	
8. Perceived entitativity	.358***	.353***	.170*	.416***	.419***	__	__	__
9. Engagement observers	.407***	.268**	.250**	.395***	.419***	__	__	.322***

*Note: *p≤.05; **p<.01; ***p<.001*

Output of all analyses Experiment 2

Table 8. Output multilevel regression for identification, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Identification	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	0.328*, *p* = .031, (0.042; 0.613)	0.293*, *p* = .042, (0.022; 0.564)
Contrast 2 (Organic vs. Mechanical)	-0.022, *p* = .894, (-0.344; 0.299)	-0.098, *p* = .533, (-0.401; 0.206)
Role	-0.030, *p* = .797, (-0.260; 0.199)	-0.120, *p* = .352, (-0.373; 0.132)
Acquaintance		0.198*, *p* = .012, (0.045; 0.350)
Comfort		-0.033, *p* = .311, (-0.096; 0.031)
Effort		0.066*, *p* = .015, (0.014; 0.118)
Fun		0.064, *p* = .228, (-0.040; 0.168)
Enjoyment		0.071, *p* = .200, (-0.037; 0.179)
Constant	4.146***, *p* < .001, (3.968; 4.324)	3.277***, *p* < .001, (2.895; 3.660)
Observations	275	273
Log Likelihood	-385.560	-362.770
Akaike Inf. Crit.	783.119	747.539
Bayesian Inf. Crit.	804.820	787.243

*Note: *p < .05; **p < .01; ***p < .001*

Table 8a. Output multilevel regression for identification for actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Identification	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.482*, *p* = .021, (0.091; 0.872)	0.511*, *p* = .012, (0.134; 0.888)
Contrast 2 (Organic vs. Mechanical)	0.246, *p* = .277, (-0.190; 0.683)	0.070, *p* = .748, (-0.353; 0.493)
Acquaintance		0.173, *p* = .100, (-0.031; 0.377)
Comfort		-0.083, *p* = .132, (-0.191; 0.024)
Effort		0.046, *p* = .399, (-0.061; 0.153)
Fun		0.098, *p* = .198, (-0.050; 0.246)
Enjoyment		0.102, *p* = .222, (-0.060; 0.264)
constant	4.118***, *p* < .001, (3.937; 4.299)	3.181***, *p* < .001, (2.650; 3.713)
Observations	142	142
Log Likelihood	-204.124	-193.078
Akaike Inf. Crit.	418.247	406.155
Bayesian Inf. Crit.	433.026	435.714

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 8b. Output multilevel regression for identification for observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Identification	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.154, *p* = .385, (-0.189; 0.497)	0.111, *p* = .525, (-0.227; 0.449)
Contrast 2 (Organic vs. Mechanical)	-0.312, *p* = .122, (-0.698; 0.073)	-0.264, *p* = .170, (-0.634; 0.105)
Acquaintance		0.252*, *p* = .043, (0.012; 0.492)
Comfort		-0.006, *p* = .888, (-0.089; 0.077)
Effort		0.068*, *p* = .029, (0.008; 0.127)
Fun		0.028, *p* = .718, (-0.125; 0.182)
Enjoyment		0.069, *p* = .376, (-0.083; 0.221)
Constant	4.146***, *p* < .001, (3.986; 4.305)	3.297***, *p* < .001, (2.766; 3.829)
Observations	133	131
Log Likelihood	-178.670	-165.881
Akaike Inf. Crit.	367.340	351.762
Bayesian Inf. Crit.	381.792	380.514

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 9. Output multilevel regression for belonging, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Belonging	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	0.289, $p = .211$, (-0.155; 0.732)	0.135, $p = .511$, (-0.262; 0.532)
Contrast 2 (Organic vs. Mechanical)	-0.348, $p = .184$, (-0.852; 0.155)	-0.318, $p = .170$, (-0.763; 0.126)
Role	-0.505***, $p < .001$, (-0.725; -0.285)	-0.393**, $p = .002$, (-0.625; -0.161)
Acquaintance		0.151*, $p = .042$, (0.006; 0.295)
Comfort		0.071*, $p = .020$, (0.012; 0.130)
Effort		0.023, $p = .363$, (-0.026; 0.072)
Fun		-0.018, $p = .711$, (-0.115; 0.078)
Enjoyment		0.141**, $p = .007$, (0.040; 0.241)
Contrast 1*Role	1.173***, $p < .001$, (0.699; 1.648)	1.231***, $p < .001$, (0.795; 1.667)
Contrast 2*Role	0.623*, $p = .023$, (0.093; 1.153)	0.385, $p = .119$, (-0.097; 0.867)
Constant	5.118***, $p < .001$, (4.910; 5.325)	3.908***, $p < .001$, (3.535; 4.280)
Observations	275	273
Log Likelihood	-383.778	-347.701
Akaike Inf. Crit.	783.556	721.402
Bayesian Inf. Crit.	812.490	768.325

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 9a. Output multilevel regression for belonging for actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Belonging	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	1.482***, $p < .001$, (0.960; 2.004)	1.359***, $p < .001$, (0.884; 1.835)
Contrast 2 (Organic vs. Mechanical)	0.273, $p = .372$, (-0.319; 0.865)	0.097, $p = .728$, (-0.443; 0.637)
Acquaintance		0.133, $p = .210$, (-0.073; 0.338)
Comfort		0.093, $p = .089$, (-0.013; 0.200)
Effort		0.029, $p = .591$, (-0.077; 0.136)
Fun		-0.103, $p = .172$, (-0.249; 0.043)
Enjoyment		0.162, $p = .053$, (-0.00003; 0.323)
Constant	4.614***, $p < .001$, (4.370; 4.858)	3.714***, $p < .001$, (3.174; 4.255)
Observations	142	142
Log Likelihood	-208.285	-194.913
Akaike Inf. Crit.	426.571	409.826
Bayesian Inf. Crit.	441.350	439.384

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 9b. Output multilevel regression for belonging for observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Belonging	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.262, $p = .170$, (-0.104; 0.628)	0.084, $p = .606$, (-0.231; 0.399)
Contrast 2 (Organic vs. Mechanical)	-0.347, $p = .109$, (-0.761; 0.066)	-0.333, $p = .069$, (-0.681; 0.015)
Acquaintance		0.171, $p = .101$, (-0.031; 0.373)
Comfort		0.044, $p = .220$, (-0.026; 0.114)
Effort		0.029, $p = .264$, (-0.022; 0.080)
Fun		0.089, $p = .181$, (-0.040; 0.219)
Enjoyment		0.103, $p = .122$, (-0.026; 0.231)
Constant	5.117***, $p < .001$, (4.946; 5.288)	3.638***, $p < .001$, (3.182; 4.094)
Observations	133	131
Log Likelihood	-173.856	-145.088
Akaike Inf. Crit.	357.712	310.176
Bayesian Inf. Crit.	372.164	338.928

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 10. Output multilevel regression for personal value, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Personal value	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	-0.164, $p = .293$, (-0.464; 0.137)	-0.260, $p = .071$, (-0.533; 0.014)
Contrast 2 (Organic vs. Mechanical)	0.535**, $p = .004$, (0.198; 0.872)	0.466**, $p = .005$, (0.162; 0.771)
Role	0.793***, $p < .001$, (0.535; 1.051)	0.754***, $p < .001$, (0.480; 1.027)
Acquaintance		0.088, $p = .295$, (-0.076; 0.251)
Comfort		0.032, $p = .361$, (-0.036; 0.100)
Effort		0.096***, $p = .001$, (0.040; 0.152)
Fun		-0.020, $p = .722$, (-0.133; 0.092)
Enjoyment		0.154*, $p = .011$, (0.038; 0.269)
Constant	2.206***, $p < .001$, (2.013; 2.399)	0.938***, $p < .001$, (0.530; 1.346)
Observations	275	273
Log Likelihood	-415.065	-381.691
Akaike Inf. Crit.	842.131	785.382
Bayesian Inf. Crit.	863.831	825.086

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 10a. Output multilevel regression for personal value for actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Personal value	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	-0.308, $p = .214$, (-0.785; 0.169)	-0.386, $p = .071$, (-0.792; 0.020)
Contrast 2 (Organic vs. Mechanical)	0.894**, $p = .003$, (0.359; 1.428)	0.671**, $p = .007$, (0.215; 1.128)
Acquaintance		0.037, $p = .739$, (-0.180; 0.254)
Comfort		-0.043, $p = .456$, (-0.157; 0.070)
Effort		0.203***, $p = .001$, (0.090; 0.316)
Fun		-0.058, $p = .474$, (-0.214; 0.099)
Enjoyment		0.247**, $p = .006$, (0.076; 0.419)
Constant	3.009***, $p < .001$, (2.788; 3.231)	1.269***, $p < .001$, (0.705; 1.833)
Observations	142	142
Log Likelihood	-226.802	-201.312
Akaike Inf. Crit.	463.605	422.624
Bayesian Inf. Crit.	478.384	452.183

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 10b. Output multilevel regression for personal value for observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Personal value	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	-0.021, $p = .909$, (-0.371; 0.330)	-0.085, $p = .647$, (-0.443; 0.273)
Contrast 2 (Organic vs. Mechanical)	0.159, $p = .434$, (-0.235; 0.553)	0.220, $p = .280$, (-0.173; 0.613)
acquaintance		0.181, $p = .155$, (-0.066; 0.429)
comfort		0.036, $p = .412$, (-0.049; 0.121)
effort		0.068*, $p = .034$, (0.006; 0.129)
fun		0.022, $p = .790$, (-0.137; 0.180)
enjoyment		0.037, $p = .649$, (-0.120; 0.193)
constant	2.200***, $p < .001$, (2.037; 2.363)	1.358***, $p < .001$, (0.807; 1.909)
Observations	133	131
Log Likelihood	-180.681	-170.255
Akaike Inf. Crit.	371.361	360.510
Bayesian Inf. Crit.	385.813	389.262

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 11. Output multilevel regression for entitativity among the actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Entitativity actors	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.759**, *p* = .010, (0.220; 1.298)	0.761**, *p* = .006, (0.256; 1.266)
Contrast 2 (Organic vs. Mechanical)	0.150, *p* = .633, (-0.460; 0.760)	-0.050, *p* = .865, (-0.624; 0.523)
Acquaintance		0.130, *p* = .317, (-0.123; 0.383)
Comfort		-0.112, *p* = .104, (-0.245; 0.022)
Effort		0.139*, *p* = .042, (0.007; 0.272)
Fun		0.002, *p* = .980, (-0.179; 0.184)
Enjoyment		0.211*, *p* = .041, (0.012; 0.411)
Constant	3.942***, *p* < .001, (3.690; 4.194)	2.642***, *p* < .001, (1.983; 3.302)
Observations	140	140
Log Likelihood	-231.739	-219.459
Akaike Inf. Crit.	473.478	458.917
Bayesian Inf. Crit.	488.186	488.334

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 12. Output multilevel regression for identification among the actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Identification among actors	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.245, *p* = .265, (-0.178; 0.668)	0.286, *p* = .144, (-0.089; 0.660)
Contrast 2 (Organic vs. Mechanical)	0.187, *p* = .448, (-0.291; 0.665)	-0.001, *p* = .998, (-0.425; 0.424)
Acquaintance		0.119, *p* = .244, (-0.080; 0.318)
Comfort		-0.130*, *p* = .018, (-0.235; -0.024)
Effort		0.090, *p* = .093, (-0.014; 0.195)
Fun		0.091, *p* = .217, (-0.052; 0.234)
Enjoyment		0.151, *p* = .064, (-0.007; 0.308)
Constant	4.236***, *p* < .001, (4.039; 4.433)	3.114***, *p* < .001, (2.596; 3.631)
Observations	140	140
Log Likelihood	-201.847	-185.725
Akaike Inf. Crit.	413.694	391.449
Bayesian Inf. Crit.	428.402	420.866

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 13. Output multilevel regression for identification of actors with observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Actors' identification with observers	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.244, $p = .253$, (-0.167; 0.655)	0.282, $p = .180$, (-0.121; 0.685)
Contrast 2 (Organic vs. Mechanical)	0.311, $p = .197$, (-0.152; 0.774)	0.133, $p = .567$, (-0.317; 0.583)
Acquaintance		0.165, $p = .169$, (-0.068; 0.398)
Comfort		-0.143*, $p = .028$, (-0.268; -0.018)
Effort		0.083, $p = .162$, (-0.032; 0.198)
Fun		0.049, $p = .577$, (-0.122; 0.220)
Enjoyment		0.157, $p = .098$, (-0.027; 0.340)
Constant	3.538***, $p < .001$, (3.346; 3.729)	2.679***, $p < .001$, (2.092; 3.265)
Observations	120	120
Log Likelihood	-176.732	-168.024
Akaike Inf. Crit.	363.465	356.049
Bayesian Inf. Crit.	377.402	383.924

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 14. Output multilevel regression for observers' perceived entitativity among actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Perceived entitativity	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.958***, $p < .001$, (0.475; 1.442)	0.834**, $p = .002$, (0.356; 1.311)
Contrast 2 (Organic vs. Mechanical)	0.300, $p = .286$, (-0.242; 0.843)	0.296, $p = .277$, (-0.229; 0.822)
Acquaintance		0.030, $p = .853$, (-0.285; 0.345)
Comfort		-0.015, $p = .787$, (-0.123; 0.093)
Effort		0.026, $p = .515$, (-0.053; 0.105)
Fun		0.249*, $p = .019$, (0.045; 0.453)
Enjoyment		-0.016, $p = .875$, (-0.215; 0.183)
Constant	3.800***, $p < .001$, (3.575; 4.024)	2.490***, $p < .001$, (1.783; 3.196)
Observations	131	129
Log Likelihood	-214.418	-198.717
Akaike Inf. Crit.	438.836	417.435
Bayesian Inf. Crit.	453.212	446.033

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 15. Output multilevel regression for identification among the observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Identification among observers	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	-0.0005, $p = .999$, (-0.421; 0.420)	0.016, $p = .942$, (-0.398; 0.429)
Contrast 2 (Organic vs. Mechanical)	-0.424, $p = .087$, (-0.896; 0.048)	-0.367, $p = .121$, (-0.820; 0.086)
Acquaintance		0.108, $p = .464$, (-0.179; 0.396)
Comfort		0.012, $p = .807$, (-0.086; 0.111)
Effort		0.069, $p = .062$, (-0.002; 0.140)
Fun		0.132, $p = .169$, (-0.054; 0.317)
Enjoyment		-0.039, $p = .678$, (-0.220; 0.143)
Constant	4.357***, $p < .001$, (4.161; 4.552)	3.455***, $p < .001$, (2.816; 4.094)
Observations	131	129
Log Likelihood	-196.866	-186.060
Akaike Inf. Crit.	403.731	392.120
Bayesian Inf. Crit.	418.107	420.719

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 16. Output multilevel regression for identification of observers with actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Observers' identification with actors	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.251, $p = .220$, (-0.143; 0.645)	0.155, $p = .448$, (-0.242; 0.552)
Contrast 2 (Organic vs. Mechanical)	0.133, $p = .559$, (-0.308; 0.573)	0.186, $p = .407$, (-0.248; 0.620)
Acquaintance		0.383**, $p = .010$, (0.101; 0.664)
Comfort		0.027, $p = .584$, (-0.070; 0.124)
Effort		0.038, $p = .288$, (-0.032; 0.107)
Fun		0.077, $p = .412$, (-0.105; 0.259)
Enjoyment		-0.015, $p = .866$, (-0.193; 0.162)
Constant	3.972***, $p < .001$, (3.789; 4.155)	3.175***, $p < .001$, (2.551; 3.799)
Observations	131	129
Log Likelihood	-192.638	-183.115
Akaike Inf. Crit.	395.277	386.231
Bayesian Inf. Crit.	409.652	414.829

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 17. Output multilevel regression for engagement of the actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Engagement actors	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	0.472*, *p* = .046, (0.025; 0.919)	0.290, *p* = .112, (-0.059; 0.638)
Contrast 2 (Organic vs. Mechanical)	0.312, *p* = .233, (-0.192; 0.817)	0.101, *p* = .617, (-0.290; 0.491)
Acquaintance		-0.022, *p* = .830, (-0.220; 0.177)
Comfort		0.069, *p* = .092, (-0.011; 0.148)
Effort		-0.031, *p* = .324, (-0.093; 0.031)
Fun		0.182**, *p* = .010, (0.045; 0.319)
Enjoyment		0.240***, *p* = .001, (0.099; 0.381)
Constant	3.819***, *p* < .001, (3.611; 4.027)	1.434***, *p* < .001, (0.980; 1.888)
Observations	271	269
Log Likelihood	-499.292	-429.090
Akaike Inf. Crit.	1,008.583	878.180
Bayesian Inf. Crit.	1,026.594	914.127

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 18. Output multilevel regression for engagement of the observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Engagement actors	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	0.894**, *p* = .009, (0.263; 1.525)	0.606*, *p* = .048, (0.026; 1.186)
Contrast 2 (Organic vs. Mechanical)	-0.012, *p* = .975, (-0.720; 0.697)	-0.051, *p* = .877, (-0.687; 0.586)
Acquaintance		0.034, *p* = .868, (-0.364; 0.432)
Comfort		0.044, *p* = .528, (-0.092; 0.181)
Effort		-0.016, *p* = .747, (-0.115; 0.082)
Fun		0.249, *p* = .062, (-0.009; 0.506)
Enjoyment		0.159, *p* = .219, (-0.092; 0.410)
Constant	4.141***, *p* < .001, (3.848; 4.434)	1.691***, *p* < .001, (0.804; 2.577)
Observations	131	129
Log Likelihood	-250.145	-228.170
Akaike Inf. Crit.	510.289	476.339
Bayesian Inf. Crit.	524.665	504.938

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 19. Output multilevel regression for arousal, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Arousal	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.464, $p = .085$, (-0.049; 0.976)	0.281, $p = .188$, (-0.129; 0.691)
Contrast 2 (Organic vs. Mechanical)	0.532, $p = .082$, (-0.049; 1.112)	0.487*, $p = .044$, (0.031; 0.944)
Role	0.214, $p = .122$, (-0.056; 0.484)	0.288*, $p = .029$, (0.032; 0.543)
Acquaintance		0.055, $p = .500$, (-0.103; 0.212)
Comfort		-0.047, $p = .156$, (-0.112; 0.018)
Effort		0.032, $p = .248$, (-0.022; 0.086)
Fun		0.318***, $p < .001$, (0.212; 0.424)
Enjoyment		0.038, $p = .504$, (-0.073; 0.148)
Contrast 1*Role	-0.425, $p = .154$, (-1.007; 0.156)	0.214, $p = .385$, (-0.694; 0.267)
Contrast 2*Role	-0.305, $p = .359$, (-0.955; 0.345)	-0.536*, $p = .050$, (-1.067; -0.004)
Constant	4.207***, $p < .001$, (3.968; 4.446)	2.372***, $p < .001$, (1.971; 2.774)
Observations	275	273
Log Likelihood	-436.569	-370.538
Akaike Inf. Crit.	889.138	767.077
Bayesian Inf. Crit.	918.073	814.000

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 19a. Output multilevel regression for arousal for actors, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Arousal	
	(1)	**(2)**
Contrast 1 (Experimental vs. Control)	0.036, $p = .893$, (-0.484; 0.556)	0.074, $p = .726$, (-0.333; 0.480)
Contrast 2 (Organic vs. Mechanical)	0.219, $p = .469$, (-0.367; 0.804)	-0.075, $p = .750$, (-0.535; 0.384)
Acquaintance		0.049, $p = .625$, (-0.148; 0.247)
Comfort		-0.084, $p = .112$, (-0.187; 0.019)
Effort		0.071, $p = .180$, (-0.032; 0.174)
Fun		0.234**, $p = .002$, (0.092; 0.376)
Enjoyment		0.151, $p = .061$, (-0.005; 0.307)
Constant	4.431***, $p < .001$, (4.189; 4.673)	2.518***, $p < .001$, (2.003; 3.033)
Observations	142	142
Log Likelihood	-227.658	-188.154
Akaike Inf. Crit.	465.315	396.308
Bayesian Inf. Crit.	480.094	425.866

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Table 19b. Output multilevel regression for arousal for observers, without (1) and with covariates (2). Coefficients, *p*-values, and 95%CI's are reported.

	Arousal	
	(1)	(2)
Contrast 1 (Experimental vs. Control)	0.442, $p = .118$, (-0.099; 0.984)	0.287, $p = .227$, (-0.170; 0.744)
Contrast 2 (Organic vs. Mechanical)	0.509, $p = .114$, (-0.106; 1.124)	0.487, $p = .070$, (-0.023; 0.997)
Acquaintance		0.105, $p = .423$, (-0.151; 0.362)
Comfort		-0.043, $p = .345$, (-0.131; 0.045)
Effort		0.047, $p = .170$, (-0.019; 0.113)
Fun		0.384***, $p < .001$, (0.219; 0.549)
Enjoyment		-0.067, $p = .423$, (-0.230; 0.096)
Constant	4.197***, $p < .001$, (3.944; 4.450)	2.463***, $p < .001$, (1.870; 3.055)
Observations	133	131
Log Likelihood	-209.292	-179.146
Akaike Inf. Crit.	428.584	378.291
Bayesian Inf. Crit.	443.035	407.043

Note: *$p < .05$; **$p < .01$; ***$p < .001$

Exploratory Mediation Experiment 2

To investigate whether we could explain the activity during the warm-up task, we performed exploratory mediation analysis testing group-level arousal and personal value on activity (2-1-2 model, MSEM, all variables in level 2; Preacher, Zyphur, & Zhang, 2010). Because we the results on activity reveal an effect of persistent activity in the organic condition, we used two dummies; dummy 1 was created to assess the difference between mechanical and organic (D1: control = 0, mechanical = -1, organic = 0) and dummy 2 was created to assess the difference between the control and the organic condition (D2: control = -1, mechanical = 0, organic = 0). For ease of interpretation of the parameters, dummies were reverse coded (0/-1). We wanted to compare the control and mechanical condition with the organic condition (referent condition), but in this case the referent condition was not a control or baseline condition. Had we not reverse coded the dummies, the positive [negative] parameters would be negative [positive].

In the models for arousal (see Figure 1 and 2), arousal (grand-mean centred) on group level and the standard deviation within a group (as a measure of heterogeneity within the group) were added as mediators. We found no indirect

effect for arousal on activity on time 1, all *p*'s > .151. However, for activity at time 2, we found a marginally significant indirect effect of the organic condition compared to the control condition on activity at time 2 via arousal at group level, indirect effect = 0.40, SE = 0.24, *p* = .089, 95%CI [-0.06;0.86]. There were no indirect effect of the standard deviations, or of dummy 1, all *p*'s > .129.

We also added personal value on group level (grand mean centred) and the standard deviation of personal value within each group to the mediation analysis (see Figure 3 and 4), We found a marginally significant effect showing an indirect effect of the organic compared to mechanical condition on activity at time 1 via personal value at the group level, indirect effect = 0.56, SE = 0.32, *p* = .082, 95%CI [-0.07;1.19]. For activity at time 2 the effect was in the same direction, although not significant, indirect effect = 0.63, SE = 0.40, *p* = .113, 95%CI [-0.15;1.40]. There was no indirect effect of the standard deviation of personal value or dummy 2 in either of these models, all *p*'s > .543.

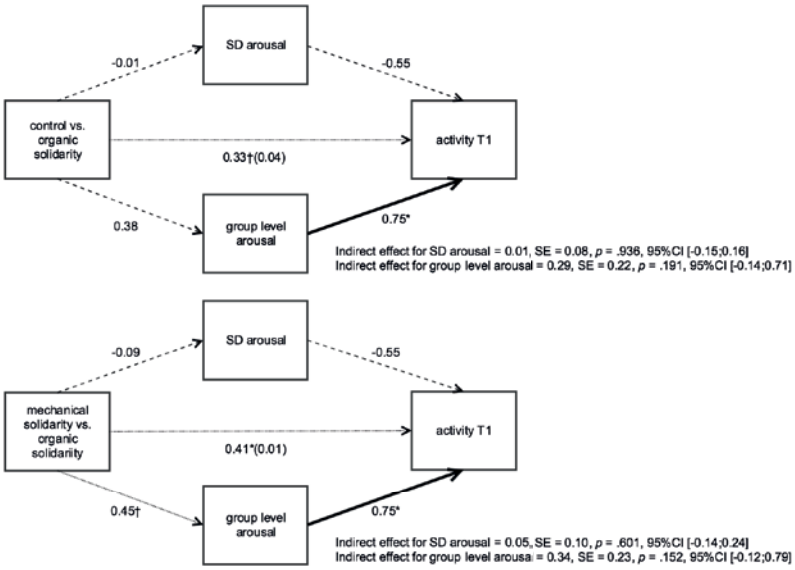


Figure 1. Mediation model showing the relationship between control vs. organic solidarity and activity at time 1 (top) and mechanical vs. organic solidarity and activity at time 1 (bottom), mediated by arousal. Path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

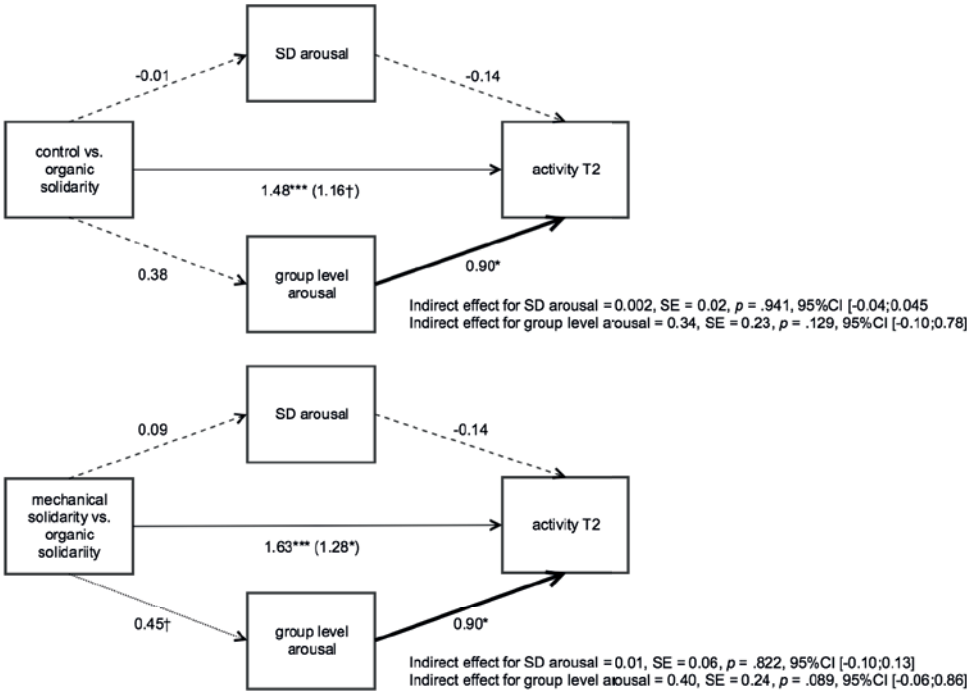


Figure 2. Mediation model showing the relationship between control vs. organic solidarity and activity at time 2 (top) and mechanical vs. organic solidarity and activity at time 2 (bottom), mediated by arousal. Path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

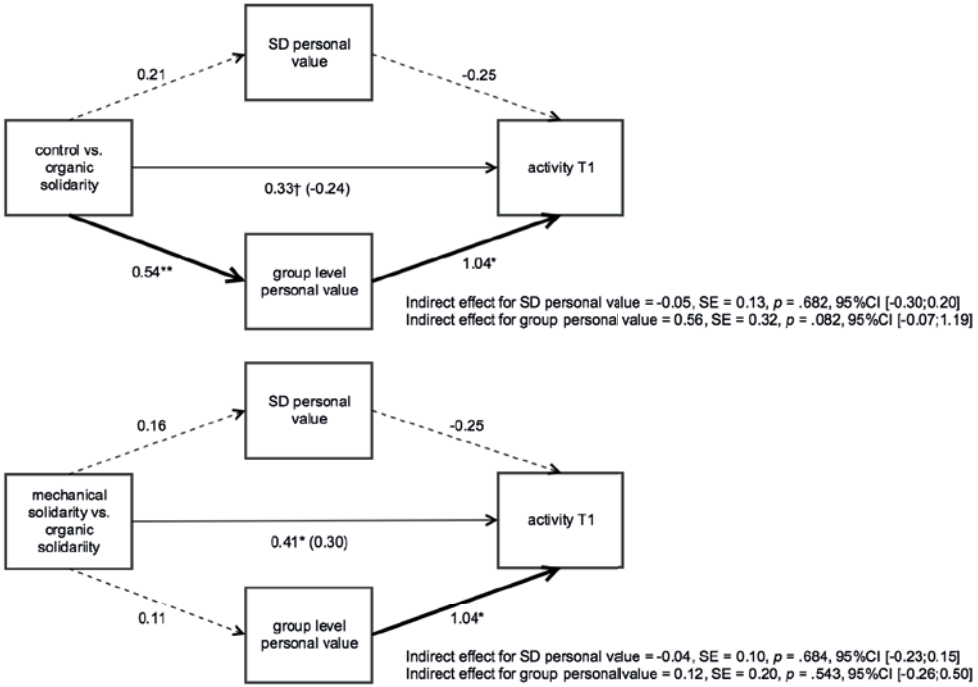


Figure 3. Mediation model showing the relationship between control vs. organic solidarity and activity at time 1 (top) and mechanical vs. organic solidarity and activity at time 1 (bottom), mediated by personal value. Path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

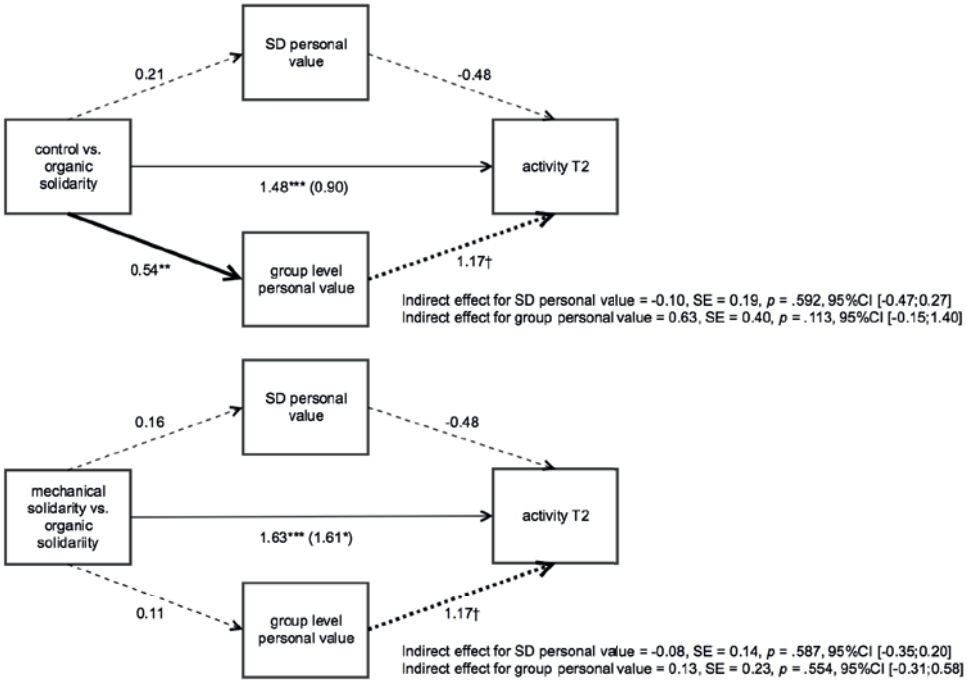


Figure 4. Mediation model showing the relationship between control vs. organic solidarity and activity at time 2 (top) and mechanical vs. organic solidarity and activity at time 2 (bottom), mediated by personal value. Path coefficients are shown; the coefficients between the parentheses are the path coefficients controlling for the mediators. Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Chapter 4

Table 1. Means and standard deviations of pre-identification and pre-mood Experiment 1, $N = 75$.

	Condition							
	Outgroup (German)				Ingroup (Dutch)			
	Asynchronous		Synchronous		Asynchronous		Synchronous	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Pre-identification	4.87	(0.59)	5.33	(0.70)	5.10	(0.70)	5.29	(0.73)
Pre-mood	6.95	(1.08)	6.94	(1.11)	7.25	(1.41)	7.00	(0.77)

Table 2. Adjusted means and standard errors for the dependent variables of Experiment 1, $N = 75$.

	Condition							
	Outgroup (German)				Ingroup (Dutch)			
	Asynchronous		Synchronous		Asynchronous		Synchronous	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Perceived entitativity	4.39	(0.27)	4.13	(0.27)	3.77	(0.26)	4.96	(0.27)
Competence	3.58	(0.29)	3.62	(0.29)	2.83	(0.28)	4.39	(0.29)
Support	3.47	(0.34)	3.24	(0.34)	3.86	(0.32)	4.81	(0.34)
Belonging	3.51	(0.20)	3.26	(0.21)	3.37	(0.19)	3.76	(0.20)
Post-mood	7.06	(0.09)	7.01	(0.10)	7.02	(0.09)	6.91	(0.10)
Post-identification	4.72	(0.12)	4.90	(0.12)	4.82	(0.11)	5.06	(0.12)

All means are adjusted at the mean value of pre-identification. Post-mood is adjusted for mean values of pre-identification and pre-mood.

Table 3. Means and standard deviations of cooperation and trust in other participants Experiment 1 (excluding participants that did not understand the game), $N = 54$.

	Condition							
	Outgroup (German)				Ingroup (Dutch)			
	Asynchronous		Synchronous		Asynchronous		Synchronous	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Cooperation	5.57	(0.85)	4.33	(1.22)	5.06	(0.94)	5.62	(1.12)
Trust	5.05	(0.80)	4.11	(1.01)	4.59	(1.09)	4.74	(1.33)

Table 4. Means and standard deviations of pre-identification and pre-mood Experiment 2, $N = 103$.

	Condition							
	Outgroup (Spanish)				Ingroup (German)			
	Asynchronous		Synchronous		Asynchronous		Synchronous	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Pre-identification	4.22	(0.99)	4.38	(0.99)	4.20	(0.67)	4.60	(0.60)
Pre-mood	4.82	(0.96)	4.81	(0.98)	4.92	(0.93)	5.27	(0.83)

Table 5. Adjusted means and standard errors for the dependent variables of Experiment 2, $N = 103$.

	Condition							
	Outgroup (Spanish)				Ingroup (German)			
	Asynchronous		Synchronous		Asynchronous		Synchronous	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Perceived entitativity	3.45	(0.21)	4.64	(0.18)	3.51	(0.20)	4.48	(0.20)
Competence	3.78	(0.20)	4.31	(0.17)	3.62	(0.19)	3.99	(0.19)
Support	3.07	(0.24)	3.34	(0.20)	3.58	(0.23)	3.74	(0.22)
Belonging	2.38	(0.24)	2.26	(0.20)	2.27	(0.23)	2.52	(0.22)
Empathy	2.82	(0.29)	3.14	(0.24)	3.49	(0.28)	3.47	(0.27)
Affective empathy	4.13	(0.20)	4.10	(0.17)	4.09	(0.19)	4.25	(0.19)
Sympathy	3.22	(0.22)	3.39	(0.19)	3.80	(0.21)	3.68	(0.21)
Trust	4.39	(0.18)	4.46	(0.16)	4.73	(0.18)	4.10	(0.17)
Post-mood	4.79	(0.12)	4.85	(0.10)	4.70	(0.11)	4.71	(0.11)
Post-identification	4.38	(0.11)	4.24	(0.09)	4.37	(0.11)	4.14	(0.10)

All means are adjusted at the mean value of pre-identification. Trust is adjusted for the mean values of acquaintance with other participants and pre-identification. Post-mood is adjusted for mean values of pre-identification and pre-mood.

Table 6. Means and standard deviations of cooperation Experiment 2 (excluding all participant who did not understand the game), *N* = 55.

	Condition							
	Outgroup (Spanish)				Ingroup (German)			
	Asynchronous		Synchronous		Asynchronous		Synchronous	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Cooperation	4.96	(1.41)	4.22	(1.33)	4.46	(0.83)	4.17	(2.12)

Table 7. Means and standard deviations of pre-identification Experiment 3, N = 123.

	Condition							
	Outgroup (German)				Ingroup (Dutch)			
	Asynchronous		Synchronous		Asynchronous		Synchronous	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Pre-identification	5.05	(0.67)	5.20	(0.75)	5.03	(0.68)	5.10	(0.63)

Table 8. Adjusted means and standard errors for the dependent variables of Experiment 3, *N* = 123.

	Condition							
	Outgroup (German)				Ingroup (Dutch)			
	Asynchronous		Synchronous		Asynchronous		Synchronous	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Perceived entitativity	2.47	(0.20)	4.11	(0.20)	2.35	(0.20)	4.29	(0.21)
Competence	2.61	(0.19)	3.42	(0.19)	2.30	(0.19)	3.19	(0.20)
Support	2.87	(0.20)	3.02	(0.20)	3.36	(0.20)	3.55	(0.20)
Belonging	2.83	(0.15)	2.92	(0.14)	2.87	(0.15)	3.12	(0.15)
Identification with German team	1.71	(0.15)	1.89	(0.15)	1.57	(0.15)	1.79	(0.16)
Identification with Dutch team	4.01	(0.30)	3.96	(0.29)	2.92	(0.30)	3.60	(0.31)
Identification with the target group	1.71	(0.23)	1.85	(0.23)	2.97	(0.23)	3.62	(0.23)
Threat of target group	1.96	(0.14)	2.44	(0.14)	1.84	(0.14)	2.25	(0.15)
Threat to ingroup	3.11	(0.13)	3.33	(0.13)	5.15	(0.13)	4.78	(0.13)

All means are adjusted at the mean value of pre-identification.

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Dutch summary

Hoe groeien groepen? Dat is de centrale vraag in dit proefschrift. Uit eerder onderzoek hebben we geleerd hoe groepen gevormd kunnen worden. Sommige groepen worden gevormd door interacties tussen individuen die het gevoel van verbondenheid in de groep bepalen. Andere groepen worden gevormd rond leden die niet noodzakelijkerwijs interacteren, maar zich verbonden voelen doordat ze een gemeenschappelijke identiteit delen, dat wil zeggen, vergelijkbare kenmerken, normen, of waarden, hebben. Hoewel er een grote hoeveelheid literatuur is over het ontwikkelen van saamhorigheid onder actieve leden van de groep, is er, voor zover bij ons bekend, geen empirisch onderzoek naar de manier waarop groepen groeien. Toch zijn er veel situaties waarin de acties van een kleine groep interacterende individuen omstanders sociaal lijken te beïnvloeden. Denk bijvoorbeeld aan een protest op straat, een concert, een voorstelling of een sportcompetitie. In al deze voorbeelden kan publiek zich psychologisch laten meeslepen in de acties van de betreffende groep (demonstranten, artiesten, atleten). Het lijkt erop dat wanneer een groep in staat is om een gevoel van saamhorigheid uit te drukken, solidariteit kan worden ervaren bij zowel de actieve groepsleden als 'passieve' waarnemers. De psychologische processen die aan dit fenomeen ten grondslag liggen zijn onduidelijk; onder welke omstandigheden wordt solidariteit overgedragen van groep naar waarnemer, en onder welke omstandigheden niet?

In dit proefschrift wilden wij verklaren hoe mensen die geen deel uitmaken van een groep zich toch psychologisch verbonden kunnen voelen door de groep slechts te observeren. We richtten ons specifiek op hoe *fysieke* interactie binnen een actieve groep solidariteit kan uitstralen en hoe dit op zijn beurt de ontwikkeling van een relatie tussen waarnemer en groep kan beïnvloeden. Onze verwachting was, en het onderzoek bevestigde dit, dat men geen interactie met de betreffende groep hoeft te hebben om een gevoel van verbondenheid of betrokkenheid te ervaren. De bevindingen in dit proefschrift dragen bij aan het begrip van hoe groepsgrenzen kunnen verschuiven van een actieve groep naar individuen die objectief gezien buitenstaanders zijn, zoals bijvoorbeeld omstanders of publiek. Het blootleggen van de sociaal-psychologische mechanismen die ten grondslag liggen aan dergelijke processen van groepsuitbreiding, biedt ons inzicht in de sociale functie van groepsactiviteiten die groepsbinding lijken te faciliteren, zoals collectieve rituelen, podiumkunsten, festivals, sport, enzovoort.

We onderzochten de processen van groepsgroei bij groepen die fysiek interacteren. We hebben gekozen voor lichaamstaal omdat we weten dat mensen heel goed zijn in het interpreteren van non-verbale interacties (zie bijvoorbeeld Burgoon et al., 1995; Knapp et al., 2014). In onze eerste twee empirische onderzoekslijnen, Hoofdstuk 2 en 3, was ons theoretische kader gebaseerd op het interactieve model van identiteitsvorming (Postmes, Haslam, et al., 2005; Postmes, Spears, et al., 2005). Dit model onderscheidt twee manieren om een sociale identiteit te vormen; een deductieve en inductieve route. Sociale identiteiten kunnen ontstaan door middel van top-down, deductieve processen wanneer groepen worden gevormd rond grotere categorieën of door de groep waar men lid van is (bijvoorbeeld Nederland) te vergelijken met relevante andere groepen (bijvoorbeeld Duitsland; Tajfel, 1978; Tajfel & Turner, 1986; Turner, 1985; Turner et al., 1987). Dit type sociale identiteit is afhankelijk van overeenkomsten tussen individuen in een groep, bijvoorbeeld het delen van kenmerken zoals nationaliteit, beroep, geslacht, enz. Het interactieve model van identiteitsvorming erkent echter dat groepen ook kunnen worden gevormd op een bottom-up, inductieve manier, door middel van sociale interacties tussen leden van de groep en hun individuele bijdragen aan de groep (Jans et al., 2011, 2012; Koudenburg et al., 2015; Postmes, Haslam, et al., 2005; Postmes, Spears, et al., 2005). In dit proefschrift werken we met non-verbale interacties en gebruiken daarom een fysieke manifestatie van deductieve en inductieve sociale identiteitsvorming. We gebruiken de termen mechanische solidariteit om te verwijzen naar de fysieke manifestatie van deductieve identiteitsvorming, die wordt gekenmerkt door uniformiteit van actie. Hierbij kun je denken aan synchronie of het spiegelen van gedrag van interactiepartners. We vergelijken dit met organische solidariteit, de fysieke manifestatie van inductieve identiteitsvorming, die wordt gekenmerkt door complementariteit van actie. Hierbij kun je denken aan mensen die verschillende handelingen uitvoeren die samen een betekenisvol geheel vormen. Wanneer men bijvoorbeeld voetbal speelt, voeren teamleden verschillende acties uit, maar door ieders unieke bijdrage en de juiste coördinatie van de handelingen kan het team de wedstrijd winnen.

In dit Proefschrift

In dit proefschrift onderzochten we drie aspecten van sociale impact; de perceptie van solidariteit, de ervaring van solidariteit met de waargenomen groep, en de ervaring van solidariteit tussen de waarnemers onderling. Solidariteit maten we aan de hand van vragenlijsten over het gevoel erbij te horen, identificatie met de groep, en het gevoel van eenheid met de groep. We veronderstelden dat waarnemers meer eenheid zouden waarnemen wanneer een groep solidariteit zou uiten (door organische of mechanische actie) dan wanneer de groep geen solidariteit zou uiten (individuele actie, ongecoördineerde actie of geen actie). Bovendien voorspelden we dat waarnemers meer de persoonlijke waarde van elk individu zouden zien bij het waarnemen van organische solidariteit in vergelijking met mechanische solidariteit. Daarnaast voorspelden we dat waarnemers, wanneer ze worden blootgesteld aan solidariteit van een groep, meer solidariteit ervaren met de groep dan wanneer ze worden blootgesteld aan een verzameling individuen. We stelden ook de hypothese dat persoonlijke waarde de relatie tussen expressie van organische solidariteit en de ervaring van solidariteit zou verklaren. Dat wil zeggen, doordat men de individuele leden van de groep als waardevol beschouwd, ervaart men solidariteit met de groep. Tot slot stelden we de hypothese dat het observeren van solidariteit, vergeleken met het observeren van gebrek aan solidariteit, zou leiden tot meer ervaring van solidariteit tussen waarnemers onderling.

In Hoofdstuk 2 onderzochten hoe publiek reageerde op het observeren van de verschillende vormen van solidariteit uitgebeeld door een groep dansers op het podium. We werkten samen met choreografen en dansers om dansvoorstellingen te ontwikkelen in twee veldexperimenten die uitdrukking geven aan mechanische solidariteit en organische solidariteit. Dit vergeleken we met een voorstelling waarin dansers weliswaar samen op het toneel dansten, maar daarbij als individuen optraden en daardoor geen onderlinge solidariteit vertoonden. Dit 'stimulusmateriaal' werd gedurende twee opeenvolgende jaren op een festival voor podiumkunsten (Noorderzon festival) uitgevoerd door professionele dansers. Dit zorgde voor een natuurlijke context met ecologische validiteit. In de laatste experimenten van Hoofdstuk 2, repliceerden we bevindingen uit het veld in een laboratoriumstudie waarin we het publiek video's van de dansvoorstellingen lieten zien. In alle experimenten werden

reacties van het publiek op deze uitvoeringen verzameld via vragenlijsten. Verder keken we in Experiment 2b ook naar de consequenties van het observeren van solidariteit op het gedrag van het publiek. We deden gedragsobservaties van groepen publiek die werden gevraagd om een taak (in de vorm van een spel) uit te voeren, direct na het zien van een van de voorstellingen. Hoe de taak werd uitgevoerd, gaf ons inzicht in de manier waarop het publiek met elkaar samenwerkte na blootstelling aan de verschillende vormen van solidariteit.

In Hoofdstuk 3 hebben we ook podiumkunsten gebruikt om de relatie tussen performers en waarnemers te onderzoeken. We simuleerden muzikale optredens door sommige deelnemers te laten optreden in "airbands" terwijl andere deelnemers observeerden. De deelnemers die werden gekozen om in de airband te spelen, speelden ofwel allemaal 'airguitar' (het bespelen van een denkbeeldige gitaar) om mechanische solidariteit teweeg te brengen, of ze speelden allemaal verschillende denkbeeldige instrumenten om organische solidariteit teweeg te brengen, of ze traden niet op (controleconditie Experiment 1) of ze traden solo op (controleconditie Experiment 2). De context in het onderzoek in Hoofdstuk 3 is vergelijkbaar met Hoofdstuk 2, omdat beide onderzoekslijnen hetzelfde theoretische kader gebruiken en podiumkunsten onderzoeken. Hoofdstuk 3 biedt echter op verschillende manieren een unieke bijdrage aan dit proefschrift. Ten eerste hebben we onze aandacht verlegd om zowel de performers als de waarnemers te onderzoeken, en te testen hoe de optredens de groep als geheel beïnvloeden. Ten tweede zijn we in Hoofdstuk 3 naar het laboratorium verhuisd en hebben we de experimentele controle verkregen die nodig is om onze bevindingen uit het veld te repliceren in een nieuwe context. Ten derde werd het onderzoek in dit hoofdstuk gedaan met amateurs: deelnemers hadden geen professionele ervaring met optreden. Ten slotte hebben we in het tweede experiment in dit hoofdstuk ook de gedragsconsequenties onderzocht na het uitvoeren en observeren van solidariteit. Deze keer keken we hoe actief de groep performers en waarnemers als geheel was tijdens een warming-up voor een ogenschijnlijke competitie tegen andere groepen.

Tot slot, in Hoofdstuk 4, hebben we gekozen voor een andere benadering door te kijken naar de randvoorwaarden van de solidariteit die waarnemers ervaren wanneer ze naar een groep actoren kijken. We waren geïnteresseerd

in hoe de sociale identiteit van de waargenomen groep van invloed is op de relatie die waarnemers ontwikkelen met de actoren. In dit hoofdstuk richten we ons niet op het onderscheid tussen mechanische en organische solidariteit, maar concentreren we ons alleen op de aan- of afwezigheid van *coördinatie* in de fysieke interactie van de actoren (synchroon versus asynchroon). Net als in de voorgaande hoofdstukken, bekijken we hoe waarnemers reageren op interacties van de groep, maar ditmaal integreren we de principes van de sociale identiteitstheorieën met de synchronie literatuur (Bernieri, 1988; Bernieri, Davis, Rosenthal, & Knee, 1994; Lakens, 2010; Launay, Tarr, & Dunbar, 2016; Miles, Lumsden, Richardson, & Macrae, 2011; Tajfel & Turner, 1986; Valdesolo, Ouyang, & Desteno, 2010). In het bijzonder richten we ons op de vraag of de effecten van het observeren van synchronie versus asynchronie, afhankelijk zijn van het kijken naar een groep waar men overeenkomsten mee vertoont (ingroup) of een groep waar men geen overeenkomsten mee vertoont (outgroup) is. Dat wil zeggen, wordt synchronie van een waargenomen groep anders ervaren wanneer de betreffende groep je eigen groep is of een andere groep is? In dit hoofdstuk gebruiken we een nieuwe onderzoekscontext: sport. Net als podiumkunsten leent deze context zich uitstekend voor de studie van non-verbale interacties en de performer-observatorrelatie. Daarnaast heeft sport, in dit geval voetbal, het voordeel dat we intergroepsprocessen konden onderzoeken. Er bestaat namelijk rivaliteit tussen verschillende teams en hun fans en dit biedt een uitstekende context voor het onderzoeken van de effecten van het delen van een sociale identiteit, in dit geval nationaliteit, met een waargenomen groep. In drie laboratoriumexperimenten hebben we de sociale impact gemeten van het kijken naar video's van amateurvoetballers van eigen of andere nationaliteit die ofwel synchroon ofwel niet synchroon opwarmden.

Samenvatting van de Bevindingen

We vonden bevestiging voor het idee dat waarnemers geen deel hoeven uit te maken van een groep, om de sociale impact van die groep te ervaren. In onze studies ontdekten we dat men de solidariteit kan interpreteren die wordt weergegeven door een groep. Ten eerste ontdekten we, in overeenstemming met onze voorspellingen, dat waarnemers die naar een groep kijken die solidariteit vertoont (organisch of mechanisch) door middel van dans of een

muzikaal optreden, de groep sociaal aantrekkelijker vinden dan waarnemers die kijken naar een verzameling individuen. Ten tweede, waarnemers die zagen dat dansers organische solidariteit vertoonden, namen meer persoonlijke waarde van de individuele dansers waar dan waarnemers die mechanische solidariteit of een verzameling individuele dansers zagen (Hoofdstuk 2). In overeenstemming hiermee vonden we in Hoofdstuk 3 dat performers die organische solidariteit uitbeeldde, inderdaad meer persoonlijke waarde ervoeren dan performers die mechanische solidariteit uitbeeldde of performers die geen actie lieten zien.
Een belangrijke bevinding is dat solidariteit van een groep kan worden overgedragen op fysiek niet-betrokken waarnemers; waarnemers die een groep zagen die solidariteit vertoonde door middel van dans of muziek, ervoeren ook meer solidariteit met de betreffende groep dan waarnemers die naar een verzameling individuen keken (Hoofstuk 2 en 3, Experiment 2) of een groep die geen interactie vertoonde (Hoofdstuk 3, Experiment 1).

Hoofdstuk 2 en 3 geven inzicht in het proces dat een rol speelt bij de overdracht van solidariteit. In Hoofdstuk 3 laten we zien dat performers die organische solidariteit vertonen, solidariteit ervaren omdat ze zich persoonlijk waardevol voelen en zich solidair voelen met de groep als geheel (inclusief de waarnemers). Dit bevestigde onze eerdere bevindingen over intragroepsprocessen (Koudenburg et al., 2015). Belangrijk is dat deze intragroepsprocessen ook verklaren waarom omstanders zich verbonden voelen met groepen die ze observeren. We vonden dat, voor mechanische vertoningen van solidariteit door middel van dans, observatie van eenheid in de betreffende groep leidt tot het ervaren van solidariteit met de groep (Hoofdstuk 2). Echter, voor organische vertoningen van solidariteit door middel van dans, leidde niet alleen waargenomen eenheid, maar ook waargenomen persoonlijke waarde van elk individu in de betreffende groep, tot gevoelens van solidariteit met de groep (Hoofdstuk 2). Dit suggereert dat de twee vormen van solidariteit verschillend zijn, zowel in de manier waarop men het beleefd wanneer men er deel van uitmaakt, als wanneer men het slechts observeert. Dit bevestigt onze hypothese dat de literatuur over groepsprocessen ook kan worden gebruikt om te verklaren hoe waarnemers, die eigenlijk geen deel uitmaken van de groep, zich verbonden voelen.

We voorspelden ook dat wanneer waarnemers gezamenlijk solidariteit zouden waarnemen, dit van invloed zou kunnen zijn op de solidariteit die zij onderling ervaren. In ons eerste experiment (Hoofdstuk 2, Experiment 1) vonden we echter geen steun voor deze hypothese, mogelijk omdat door de opzet van het onderzoek de leden van het publiek niet konden interacteren na de voorstelling. In het tweede experiment (Hoofdstuk 2, Experiment 2) hebben we daarom waarnemers de gelegenheid geboden om te interacteren na blootstelling aan de dansgroep. We vonden hierbij een verschil in de manier waarop ze met elkaar interacteerden, afhankelijk van de solidariteit die ze vooraf hadden geobserveerd. We gaven groepen waarnemers een taak waarin ze objecten door de ruimte moesten verplaatsen. Deze taak vereiste planning en coördinatie. We ontdekten dat waarnemers die mechanische solidariteit hadden gezien, deze taak gelijk vanaf het begin op een zeer gestructureerde manier uitvoerden. Waarnemers die organische solidariteit hadden gezien, waren eerst minder gestructureerd, maar werden gedurende de taak meer gestructureerd en presteerden uiteindelijk net zo goed als degenen die mechanische solidariteit hadden gezien. Waarnemers die een verzameling individuen hadden gezien, leken gedurende de hele taak ongestructureerd. Dit is onze eerste indicatie dat de overgedragen solidariteit van invloed kan zijn op waarnemers als groep; het verandert niet alleen de relatie die men als individu ontwikkelt met de groep, het lijkt ook de relatie die men heeft met de mensen om zich heen te kunnen beïnvloeden. Interessant is dat we de taak in Hoofdstuk 3 (Experiment 2) hebben veranderd in een taak waarbij de hele groep (performers en waarnemers) moest opwarmen voor een ogenschijnlijke competitie. Hier zagen we dat performers en waarnemers van organische solidariteit gedurende de hele taak actief bleven, terwijl performers en waarnemers van mechanische solidariteit en individuele uitvoeringen, een dalende activiteit hadden. Activiteit zou hier een indicator kunnen zijn voor groepsinzet (meer inzet om de daaropvolgende wedstrijd te winnen), waarbij we voorzichtig kunnen concluderen dat groepen in de organische conditie meer toegewijd waren aan de groep dan de groepen in de andere condities. Uit beide studies zouden we dus kunnen concluderen dat de ervaren solidariteit het gedrag van de groep anders beïnvloedt, afhankelijk van de soort taak. Wanneer de taak structuur of coördinatie vereist, kan het aannemen van een mechanisch gevoel van solidariteit wellicht het gunstigst

zijn, terwijl wanneer activiteit of betrokkenheid vereist is, kan een organisch gevoel van solidariteit het meest gunstig zou kunnen zijn.

Hoofdstuk 4 richt zich tenslotte op een randvoorwaarde van de overdracht van solidariteit tussen groep en waarnemer; verandert de sociale identiteit die men deelt met een groep iemands perceptie van en relatie tot die groep? In een sportcontext hebben we gekeken naar de manier waarop gedragscoördinatie (synchronie versus asynchronie) van een eigen of andere groep (gebaseerd op nationaliteit) waarnemers sociaal beïnvloeden. We ontdekten dat synchronie een belangrijke voorspeller is van sociale perceptie; een voetbalteam dat synchroon opwarmde, werd gezien als meer verenigd en bekwamer dan een voetbalteam dat asynchroon opwarmde. Echter, als het gaat om de relatie die waarnemers ontwikkelen met de groep, is sociale identiteit van de betreffende groep de belangrijkste voorspeller. Waarnemers steunen en identificeren zich meer met een groep wanneer dit mensen zijn met wie zij duidelijk overeenkomsten vertonen is in plaats van mensen die duidelijk anders zijn, ongeacht de synchronie die zij vertonen. Dit suggereert dat sociale identiteit een dominante factor is bij het bepalen van de relatie die waarnemers met een groep ontwikkelen. Deze reeks onderzoeken draagt bij aan ons begrip van wanneer en hoe waarnemers psychologisch betrokken raken bij de acties van de waargenomen groep. Dat wil zeggen, in de context waarin er een sterke concurrentie tussen groepen is, kan het ervaren van solidariteit met een waargenomen groep afhankelijk zijn van het delen van een sociale identiteit met die groep en is dit minder afhankelijk van de interactie die de betreffende groep vertoont.

Conclusie

Kortom, het onderzoek in dit proefschrift geeft inzicht in hoe mensen zich aanpassen aan hun sociale omgeving door solidariteit van groepen om zich heen te interpreteren en te internaliseren. Nieuwe sociale structuren kunnen ontstaan door blootstelling aan een groep mensen die interacteren. Op deze manier kunnen groepen groeien voorbij de grenzen van de interacterende groep om diegenen te omvatten die niet betrokken zijn bij de interacties. Deze psychologische groepsuitbreiding hoeft niet plaats te vinden via de traditionele processen van sociale categorisatie, maar kan voortkomen uit processen van

sociale perceptie en internalisering van solidariteit. Dezelfde processen die de vorming van kleine groepen door interactie verklaren, kunnen dus ook verklaren hoe omstanders zich psychologisch verbinden met groepen waar ze voorheen geen lid van waren. Deze nieuwe inzichten over de psychologische flexibiliteit van groepsvorming en groei kunnen ons helpen bij het begrijpen van hoe groepen in samenlevingen zich vormen en evolueren

A

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"We never miss a beat, we've still got sand on our feet
And we took a selfie, we took a selfie
We're dancing through the van, making moves when we can
And that's when we lost Go, we lost Sarango"

When my office adventures with Felicity came to an end, I had my eye on a new office mate. Serendipity brought me Kim from a far-away land. In her first week in Groningen Kim agreed to be part of one of our insane Daily Wing stories; and right then we knew; she's a keeper. Thus, when Felicity left the office, I immediately 'claimed' Kim. Kim, I thank you for letting me claim you, because, again, I was blessed with another awesome, modest, and sweet office mate. Looking back on my time with you it feels like we had more coffee breaks than we did work. Towards the end of my PhD I had to get more serious about finishing, and the more serious I got the more coffee breaks I needed. You joined me, almost always. And those breaks, the chats, the laughter, the distraction, made finishing incredibly relaxed. I have you to thank for that! All those coffees with you where my fuel for finishing. Thank you for your friendship, your loyalty, conference skipping to go to the beach, and making diligent notes during our GoT nights.

"Stick 'em with the pointy end." – Jon Snow to Arya Stark

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K

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